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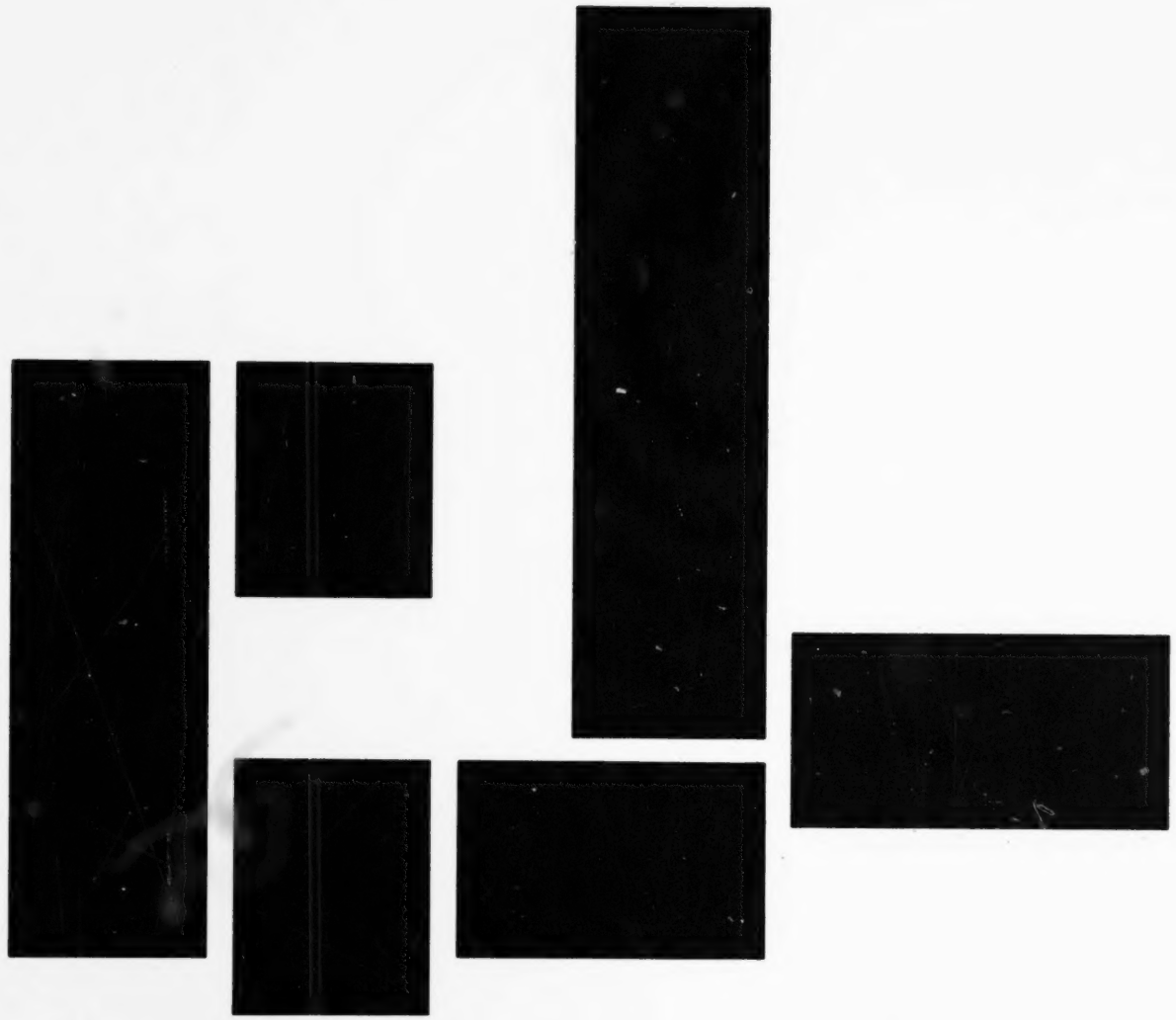
Planning and design procedures which one medical education center employed in translating its educational objectives, philosophy and techniques into laboratory, classroom and clinic facilities are described. Basic planning considerations included--(1) determination of the curriculum, (2) facility utilization rate, (3) housing of research activities, (4) planning of ancillary facilities, and (5) zoning of facilities. Specific design studies were conducted on four major facility groupings--(1) the commons, or general facilities for the use of students and faculty, and classrooms to house basic clinical instruction, (2) the medical sciences unit, for housing of instructional and research activities, (3) the resource unit, for library and other self use facilities, and (4) the clinics unit or the patient care areas. Each study considers primary medical and educational functions, communications and circulation relationships and possible physical layouts. Site planning and development procedures established the optimum interrelationships for efficient functioning, circulation and access for the four groupings and a fifth doctors' grouping. Included is an appendix which presents the results of their study to define the specific needs and objectives of the medical program. (BH)



DESIGN FOR MEDICAL EDUCATION

AN EFL PROJECT REPORT

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DESIGN FOR MEDICAL EDUCATION

THE DEVELOPMENT AND PLANNING OF A MEDICAL COLLEGE AND CARE CENTER

A REPORT FROM THE GEORGE WASHINGTON UNIVERSITY SCHOOL OF MEDICINE EDUCATIONAL FACILITIES STUDY
THOMAS M. PEERY, M.D., DIRECTOR • ALAN C. GREEN, M.ARCH., CO-DIRECTOR

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FOREWORD

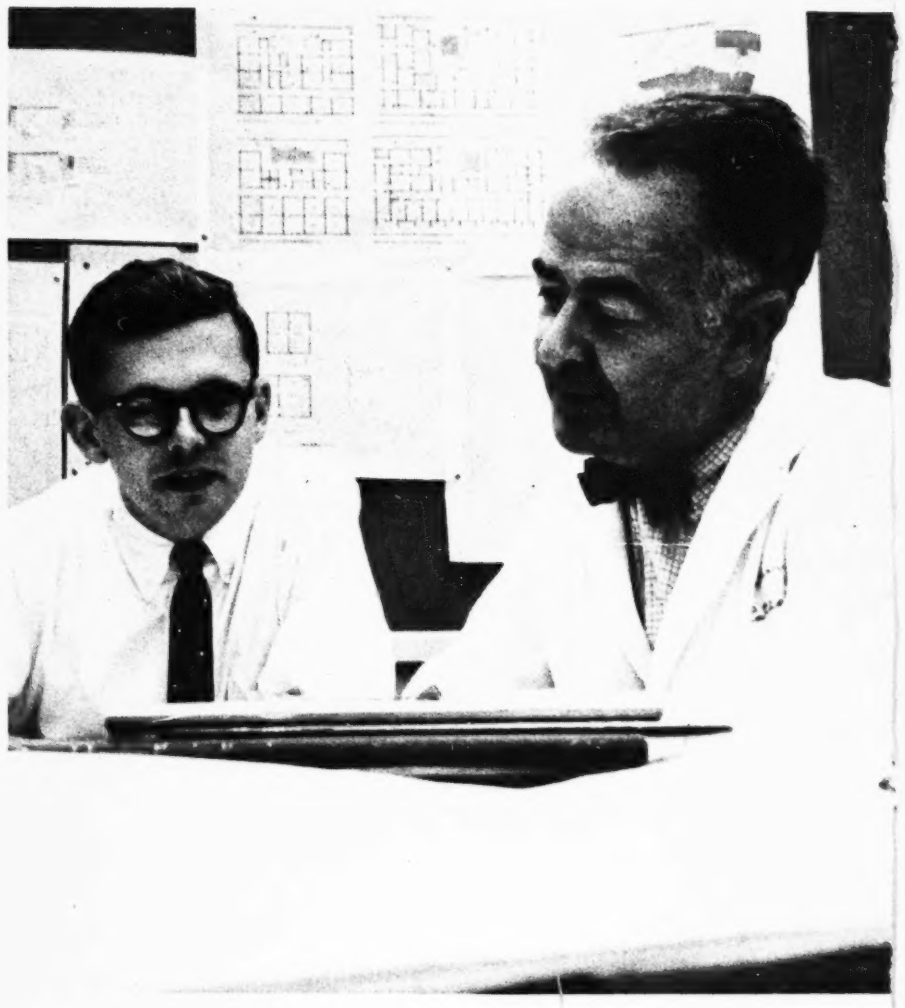
This report describes the steps one medical school has taken to translate its educational objectives, philosophy, and techniques into laboratory, classroom, and clinic.

The study on which it is based comes at a time of great unrest in education generally. Long accepted principles and practices are under critical scrutiny. The machinery of education has been multiplied—and so has its cost.

This unrest is nowhere more evident than in medical education. Since World War II a sudden interest in curricula, pedagogical principles, and teaching methods has burst upon the faculties of medical schools. The value of the lecture is being restudied; the format of the examination is being questioned; the role of the patient is being reconsidered. New medical schools are being organized and old ones are revamping their teaching programs and expanding their facilities.

Nor are medical educators the only people showing interest in medical education. The public has suddenly become deeply concerned about the developing shortage of physicians. Where will the new doctors come from? Why is medical education so expensive? What is the proper role of government in the support of "private" medical schools?

At The George Washington University, in the Nation's Capital, these questions and others related to medical education have been under study. The Faculty of the School of Medicine has considered carefully its own objectives and resources and has drawn up a new curriculum greatly liberalizing the format of the medical course. They have evaluated



the significance of newer educational methods* and have modified certain technical aspects of their teaching program. Perhaps most important of all, they have restudied the special role of the patient in medical education and have oriented their instruction to provide a new emphasis on the personal nature of good medical care.

A special feature of the new educational program is the opportunity it provides for each student to develop according to his own needs and wishes and at his own speed. This individualized approach to medical education requires an increased flexibility of curriculum and schedule. This flexibility will be achieved by the development of a trimester program and by admitting two classes each year.

Full development of this program will require new teaching quarters, since the present buildings of the School of Medicine are old, overcrowded and unsuitable for year-round teaching. Furthermore, the present buildings are located in the heart of the city, almost a mile away from the University Hospital, which is located on the edge of the main University campus. Eleven city blocks, including the city's financial district, the White House, and a cluster of busy office buildings and down-town hotels, separate the two areas.

To correct this situation, the University has decided to build a new Medical School on a two-block site adjoining the University Hospital and thus create a unified medical college and care center. The medical faculty, with the help of a grant from Educational Facilities Laboratories, has made a detailed study of the physical resources needed to support the new educational program and the new teaching methods it entails.

In addition to the existing hospital, five functional groupings of facilities** have been defined, based on the requirements of the revised curriculum. These five groupings or units are:

1) THE COMMONS—general facilities for the use of students and faculty, and classrooms to house basic clinical instruction.

2) THE MEDICAL SCIENCES UNIT—housing for the instructional and research activities related to the basic medical sciences.

3) THE RESOURCES UNIT—the library and other self-use resources to aid learning and to support classroom instruction.

4) THE UNIVERSITY CLINICS UNIT—facilities for ambulatory patient care, with necessary service and support areas.

5) THE DOCTORS' OFFICE BUILDING—a unit combining private doctors' offices, commercial establishments, and transient living accommodations for ambulatory patients.

This report presents some of the basic considerations in the planning of the first four of these units. Our purpose is not simply to house GW's new program, but also to emphasize its objectives, support the activities of the faculty, and increase the student's desire to learn.

T. M. P.
A. C. G.

* An institute entitled "Appraisal of Teaching Techniques with Application to Medical Education," featuring demonstrations and workshops, was held in The George Washington University on April 12-13, 1963. More than four hundred individuals, mostly faculty members of the School of Medicine, attended.

** It should be noted that these are not necessarily five different buildings. The question may be determined by the nature of the site, the height of the buildings, and other factors.

SPECIAL FEATURES OF MEDICAL EDUCATION

All educational programs require an environment for effective communication between teacher and student and access to accumulated knowledge through libraries and other sources of self-help. Medical education presents certain additional requirements that are peculiarly its own. These special requirements of medical education have a number of implications for the design of facilities.

THE SUBJECT MATTER

THE SCIENCE OF MEDICINE is quite similar to other natural sciences, and in general requires the same types of facilities. The laboratories, however, are highly specialized and often cannot be shared, which means less than optimum occupancy.

THE ART OF MEDICINE (clinical diagnosis and treatment), on the other hand, depends on the relationship of doctor to patient, and is based on the powers of observation and communication. This vital personal aspect of medicine cannot be taught except by precept, or learned except by direct experience with patients. Most of the special problems of medical education, its housing and its high cost, are related to the patient. Relying on the patient as a learning resource means that hospitals and clinics must be provided, equipped and staffed to meet all the patient's medical needs. Providing adequate patient services means that facilities for medical education should be located in an urban area where land costs are high. In addition, since sick people cannot be used to demonstrate every special feature of an illness and every diagnostic and therapeutic technique, medical education must rely heavily on instructional aids—motion pictures, manikins, television and recordings—and the production of these requires skilled technicians and extensive equipment.

THE RAPID EXPANSION OF MEDICAL KNOWLEDGE also provides a special problem. Each issue of hundreds of medical journals must be reviewed currently and its contents coded. This means that a large and specialized library staff is needed, plus mechanical means for storage and retrieval of information.

THE FACULTY

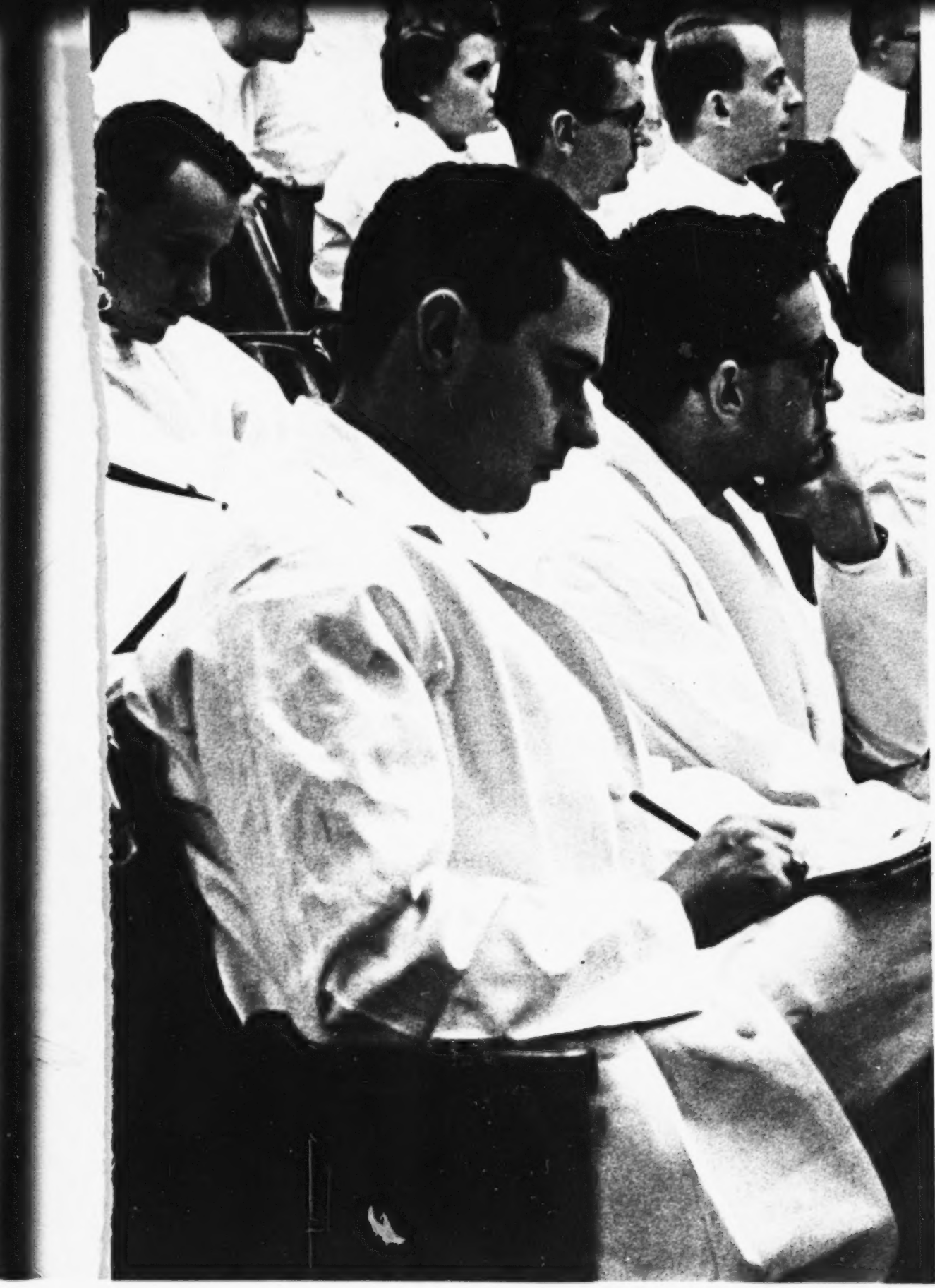
Because of the many disciplines and specialties taught, and the need for individual instruction related to patient care, medical schools usually have two or three teachers—most of them part-time—for each student. The sheer size of the faculty, plus its diverse activities and constant movement, add up to a greater need for faculty facilities, communications and services in the medical school than in other divisions of the university.

THE STUDENT

Medical students are older than students in other fields, and their needs are different. There is little interest in the extracurricular activities of the university; most of the student's time outside class is spent either in study or in helping to support himself. Housing often presents a special problem, since many medical students are married and have families. In most instances the wife must work in order to help support the husband while he is in medical school.

MEDICAL RESEARCH

More time and money are spent in medical research than in all other research combined, and a major portion of the nation's medical research is conducted in the medical schools. Medical research is inseparably bound to medical education. Faculty members divide their time between education and research, and are attracted to those schools having a large commitment to research. The space requirements for research will, in many instances, exceed those for instruction.



BASIC PLANNING CONSIDERATIONS

THE CURRICULUM

The faculty of The George Washington University School of Medicine decided early in the 1950's that the educational program must be clearly detailed before architectural planning could begin. Accordingly, the faculty undertook an intensive study of all the facets of its program and devised a new curriculum, relating it to the special needs and resources of the Capital City.

It was generally agreed that medical faculties cannot teach, nor students learn, in a few short years, all there is to know about medicine. Hence the faculty adopted an educational program comparable to undergraduate and graduate programs in other fields, offering basic "undergraduate" instruction in medical school as a foundation for graduate training in special fields. The undergraduate course includes an extensive offering of electives among which the student may find, with the help of professional counsellors, that area of medicine for which he is best suited.

The central philosophy of GW's new curriculum can be summed up in the admonition, "LEARN TO CARE." Emphasis is placed on the role of the patient in medical education, the responsibility of the physician to his patients and his community, and the personal nature of good medical care. Special features include an extremely flexible schedule in which the student can accelerate or decelerate according to his own needs and desires; a broad program of electives; active participation by the student in the learning process, as preparation for his continuing self-education after graduation; and an increased output of physicians.

BASIC PLANNING CONSIDERATIONS

Rather than increase the size of its classes, the faculty decided to admit two classes each year. By dividing the year into three 16-week terms, and teaching each basic course in two of the three terms, it will be possible to increase the output of physicians, improve the utilization of facilities, and derive a much more flexible schedule. While most students will probably follow a "normal" four-year course, completing two terms per year, some may elect to omit all "normal" vacations and to graduate in three years. Others may take a reduced schedule or drop out of school for a term or two, picking up their regular courses with the next class. These and other features of the new curriculum have been described in more detail elsewhere.*

The role of the new curriculum in the design of facilities will be described further in following sections of this report.

INCREASING UTILIZATION OF INSTRUCTIONAL FACILITIES

High space utilization is desirable for reasons of economy, but it must be recognized that some medical school facilities, e.g., certain highly specialized student laboratories, must be designed for a specific instructional program. For their basic courses, the GWU faculty has agreed on a most effective system for increasing space utilization, i.e., teaching the same course in two of the three terms of the year. For most electives, one space can serve for similar courses taught in different terms, or multi-discipline spaces can be shared by two or more courses in the same term. In rare instances, the subject matter of two courses may be fused so that only one facility is required. Efforts to increase space utilization must start with a study of instructional needs and use schedules.

HOUSING RESEARCH ACTIVITIES

Since the investigator is the key to all research activities, it is logical to approach the problem of housing for research in terms of the individual faculty member. Research facilities should be located so that no time is wasted as the faculty member moves back and forth between his work with students and his research studies. Research laboratories for the basic scientist are best housed in the medical science unit in close approximation to departmental offices and teaching laboratories. For the clinician whose research is often patient-oriented, it is necessary to provide facilities in the hospital and out-patient areas. In programming these areas, the additional requirements imposed by research must be carefully considered.

SUPPORT AND SERVICE FACILITIES

The functioning of major medical school facilities depends on rational planning of the ancillary facilities which service and support them. "Rational planning" means grouping these facilities for better function, supply, staffing and control, as in the support and service "core" described in the program for the Medical Sciences Unit and the University Clinics Unit. Elsewhere in the Center, a consolidation of like facilities serving multiple units will result in increased efficiency, as in animal quarters, central shops and stores, washing and distribution of glassware, receiving and shipping, food storage and service, and plant maintenance.

THE ZONING OF FACILITIES

Since different units contain a number of facility types, each with its own requirements for access and circulation, servicing, and floor to ceiling heights, it is logical to group facilities having similar requirements on one level or in one area. Properly applied, zoning can lower construction and operating costs, improve access and circulation, reduce noise level, and facilitate future changes in space allocation and function.

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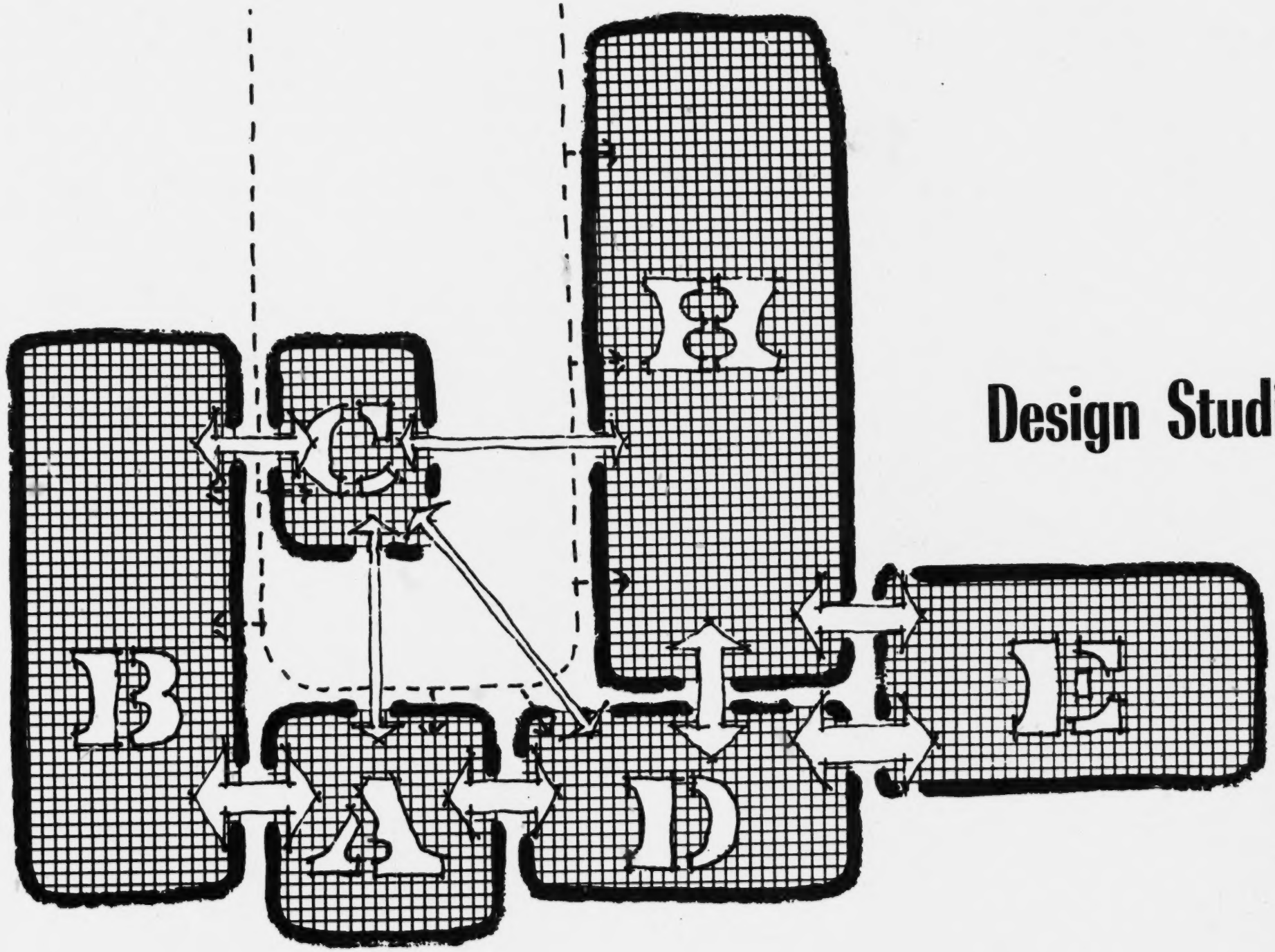
* Peery, Thomas M., "The New Educational Program of The George Washington University School of Medicine," in Bulletin of the Federation of State Medical Boards of the United States, March, 1963.



Design Studies

DESIGN STUDIES

In the following sections, the four functional units of the Center, exclusive of the teaching hospital and the doctors' office building, will be considered as if they are separate buildings, although this is not necessarily the case.

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THE COMMONS Unit A

Essentially the Commons serves three purposes: it provides facilities shared by the whole Medical Center (control and information, public meeting rooms, lounge areas and administrative offices); it provides classroom space for certain courses; and it houses the clinical faculty (Table A).

Obviously the functions of the Commons Unit dictate that it be conveniently located, adjacent to the Medical Sciences Unit, the University Clinics (ambulatory care) unit, the Resources Unit (library) and the hospital. Primary access for visitors to the Center should be through the Commons to provide information and control. If food services are to be housed in the Medical Center, the Commons would be a logical place for their inclusion. The schematic (Figure 1) shows the location of the various facilities in the Commons and the relationship of this unit to other units of the Medical Center.

The lounges and public rooms on the first floor provide for society meetings, special lectures, faculty gatherings, and programs for continuing education as well as regular student classes. These facilities constitute the "front parlor" of the Medical Center, and as such, should be attractive and pleasant and easily accessible. The Commons provides an appropriate point of interchange between the basic scientist and the clinician, an interchange which should certainly be encouraged. Support areas such as storage, kitchenette, and rest rooms must be given careful consideration to insure proper functioning and servicing.

The administrative offices of the School of Medicine, offices of the full-time clinical faculty, and offices for student organizations, are areas of lowest traffic density and should be located on upper floors away from distracting and unwanted general circulation.

The courses of Terms IV and V of the New Curriculum (see Appendix) will be housed in the Commons. In these courses, which have been characterized as an academic bridge between the basic and clinical sciences, the student is introduced to the theories and principles of medical care. Lectures for classes of 100, as well as demonstrations for groups of 30 to 40, must be housed. The lecture halls, which will also be used for special meetings, are not particularly unique in design, but should permit the use of films, slides and television.

However, the smaller demonstration rooms do require special consideration. Here, in courses such as "Major Clinical Situations," the student will take part in demonstrations utilizing patients in some instances, life-size manikins in others, and will learn to use the equipment and apparatus necessary for examination, diagnosis and treatment. Mock-ups will simulate the patient's room, and specialized diagnostic and treatment rooms, with the students manipulating the materials and equipment that are under study. The desired effect can best be achieved by means of small amphitheaters, located on the first floor for ready access to the hospital and clinic, and convenient to storage and preparation areas. These demonstration rooms can also be used for elective courses and for basic science discussion and quiz groups. Three alternate schemes for the demonstration rooms are illustrated in Figure 2* (Plans I, II and III).

* Illustrations of the design studies throughout the report were developed by Annette Gottschalk.

THE COMMONS

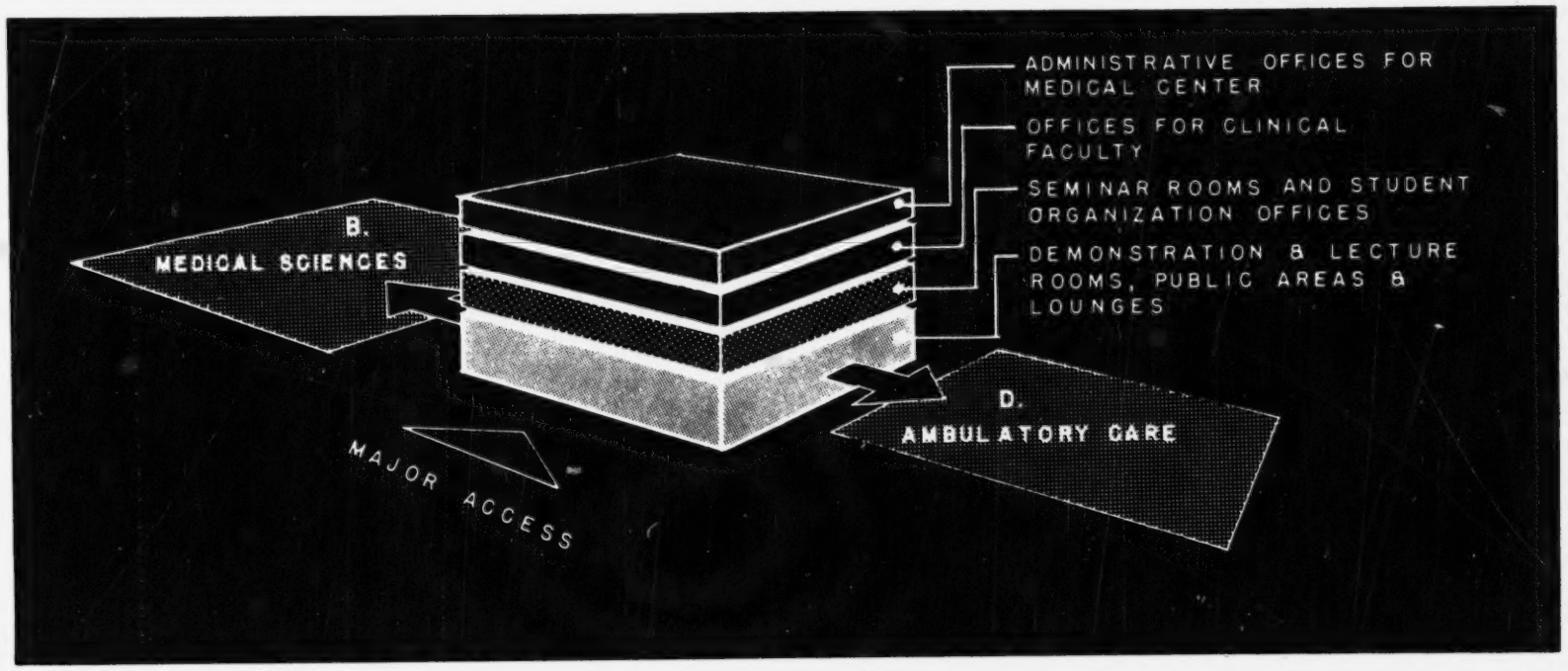


FIG. 1. Schematic—The Commons (Unit A) housing the administrative offices of the Medical Center as well as certain faculty and student functions, should be centrally located.

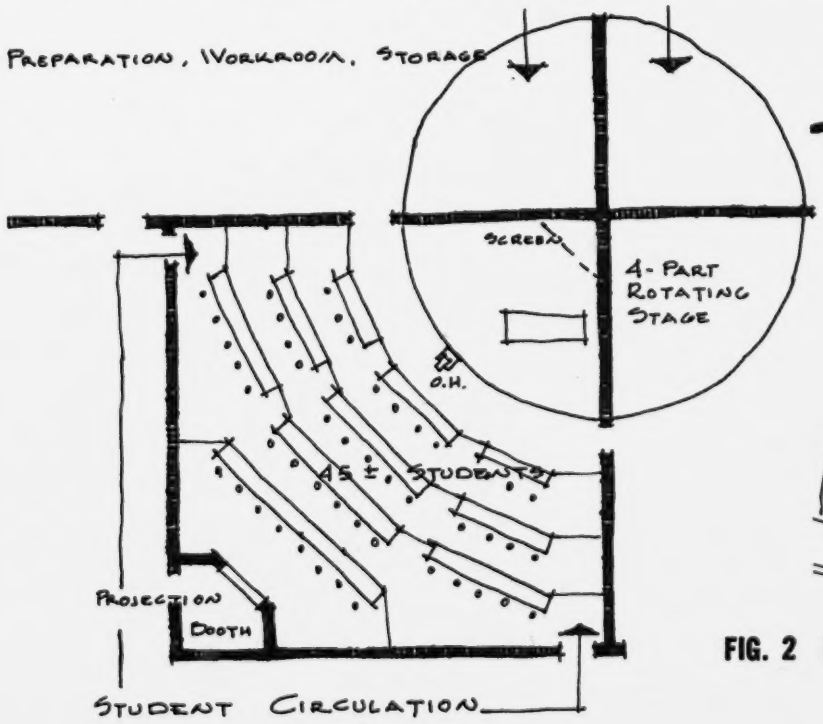
FIG. 2. (below) Demonstration Rooms (20-65 students) for learning diagnostic and therapeutic procedures using mock-up of hospital rooms. Plan I incorporates a rotating stage so that several "situations" can be set up prior to the class period and brought into position as desired. Plans II and III permit students to come down easily from their gallery seats into the demonstration area.

TABLE A

THE COMMONS (UNIT A) INCLUDES:

1. Central information and control—receptionist, center directory, switchboard, mail.
2. Faculty and staff areas—lounge with kitchenette, committee and conference rooms.
3. Student areas—lounge, lockers and dressing areas, organization offices, snack bar and kitchenette.
4. Large multipurpose meeting rooms —facilities for continuing education of the physician, medical meetings, and student and faculty groups.
5. Administrative offices—dean, associate deans, student records, admissions, alumni, student counseling.
6. Offices for the clinical faculty.
7. Lecture and demonstration rooms for the courses of Terms IV and V, the 'intermediate terms."
8. Stores—medical textbooks, student supplies, etc.

(estimated net space requirements, The Commons: 40,000 square feet)



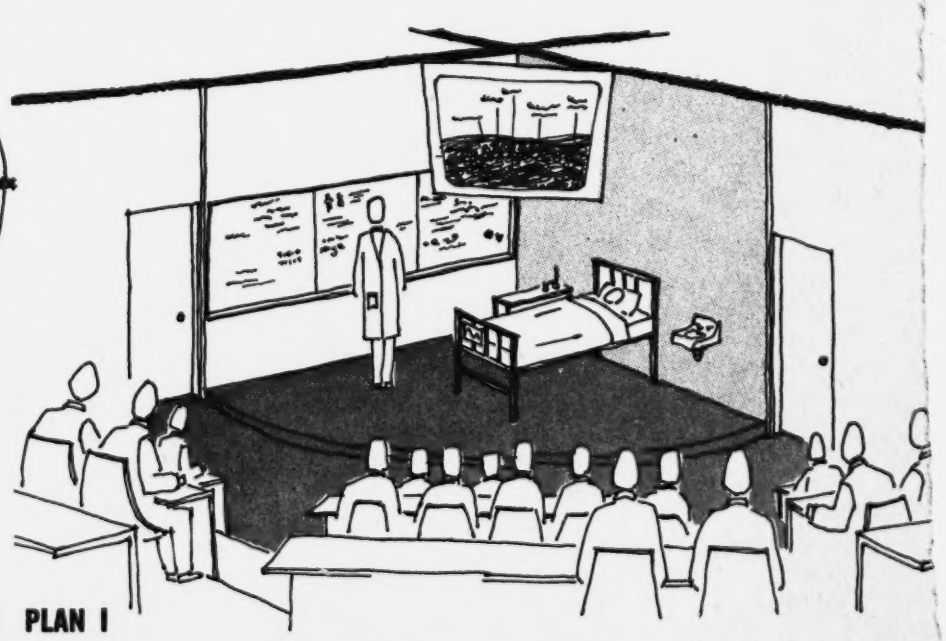
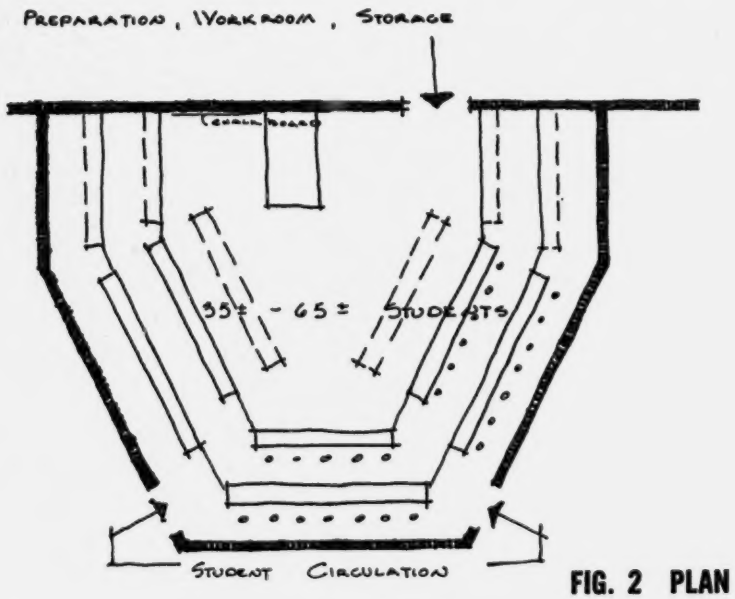


FIG. 2 PLAN I



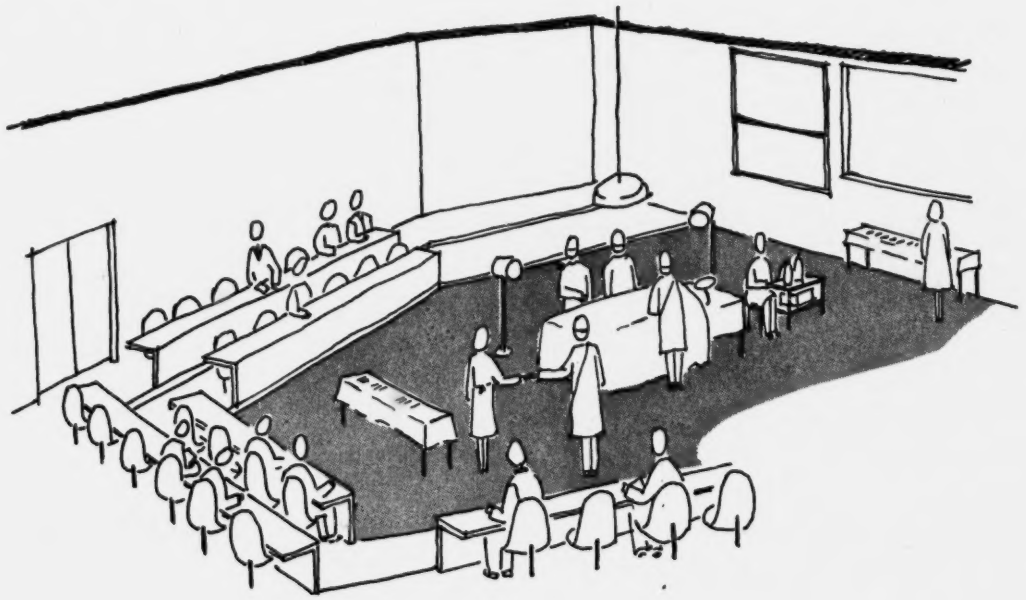
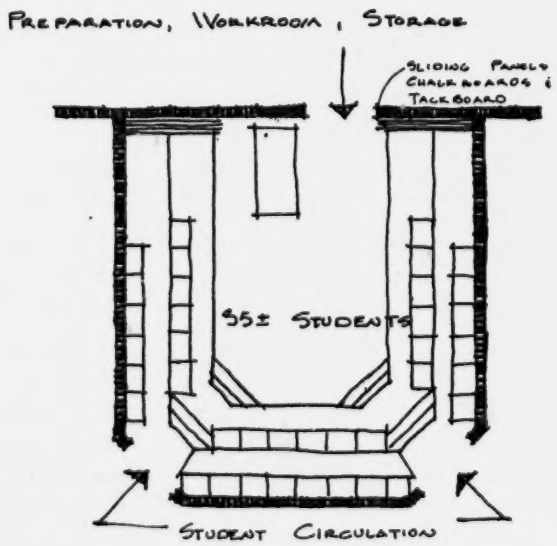


FIG. 2 PLAN II



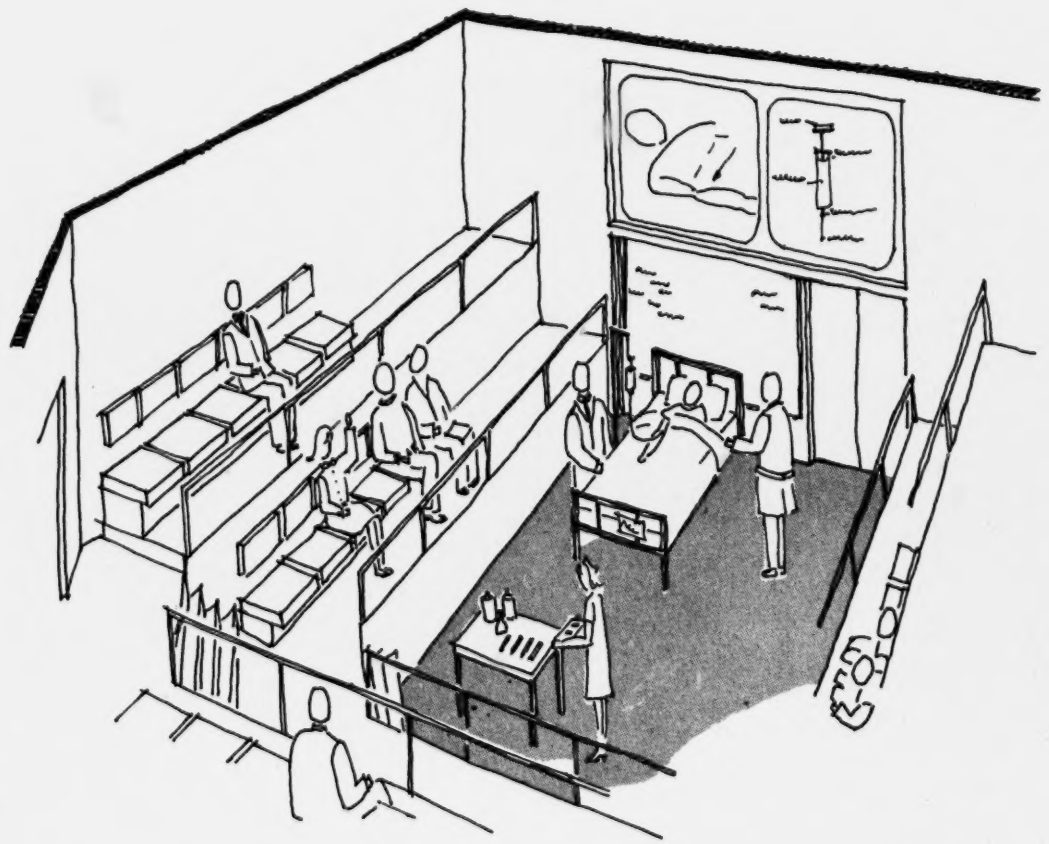


FIG. 2 PLAN III

THE MEDICAL SCIENCES

Unit B

For the first two years of his medical schooling, the student spends most of his time in the classrooms and laboratories of the six basic medical science departments: Anatomy, Biochemistry, Physiology, Microbiology, Pathology and Pharmacology. The Medical Sciences Unit will house all of the teaching, administrative and research functions of these six departments (Table B).

PLANNING FOR THE PRESENT AND THE FUTURE

Such a departmental organization is not, however, fixed for all time. New departments may be added or old departments combined or abolished; the role of some departments may expand or contract.

In addition, curricula, course content and schedules will certainly continue to evolve, and new methods, equipment and materials will be incorporated to improve the teaching process and to update medical education. Many of these developments are not foreseeable now, but they will have to be accommodated in buildings constructed now. A highly rigid and restrictive arrangement of facilities, uncompromising as to future changes in departmental structure, curricula, schedules and teaching methods, should be avoided.

The conventional medical sciences building is not planned to permit the broad changes in methods and organization that will surely come during the life of the building. Typically a floor or a portion of a floor is assigned to a department, and research laboratories, offices, student laboratories, lecture rooms, conference rooms and preparation areas stretch down the length of a central corridor. Large groups of students enrolled in basic science courses circulate throughout the entire building, requiring massive vertical transportation, and lobbies and extra-wide corridors on all floors. There is noise and confusion with the changing of classes, and this is disruptive to research activities and faculty study. In addition, some waste in space results. An office and a lecture hall require different floor-to-ceiling heights; when they are side by side a waste of space occurs above the office area, or the ceiling in the lecture hall is made too low.

These ideas suggest the arrangement of basic science facilities which has been adopted in this study (see Figure 3). Facilities of generally the same type and functions are grouped together horizontally and large group spaces, such as lecture rooms and student laboratories, are located at the lowest levels to permit easy direct circulation. Smaller group spaces, such as conference and seminar rooms, are located on intermediate floors. Faculty offices and research laboratories are located on upper floors. Each department is assigned appropriate space on several floors. Unnecessary traffic is excluded from the research and office areas on the upper floors. As departmental requirements change, space assignments can be easily modified (see Figure 3).

In addition, it will be noted that the concept of a support and service core has been developed. This core (Figure 4) can be thought of as a long narrow warehouse supplying materials and services to classrooms, offices and laboratories at all levels and throughout its length. Organized vertically by departments, it contains all supply, storage and preparation areas, special equipment, hot and cold rooms, sub-central animal facilities, vertical transportation, and utilities. This consolidation of support and service facilities will result in economy of construction and operation, will facilitate staffing and utilization, will create isolation from unwanted circulation, and will simplify future changes in organization and function. The support and service core can be double loaded to serve a building with a large square floor area, or can be single loaded to serve a long narrow building. The latter can be converted to the double loaded design at a later date, thus lessening the cost of future expansion.

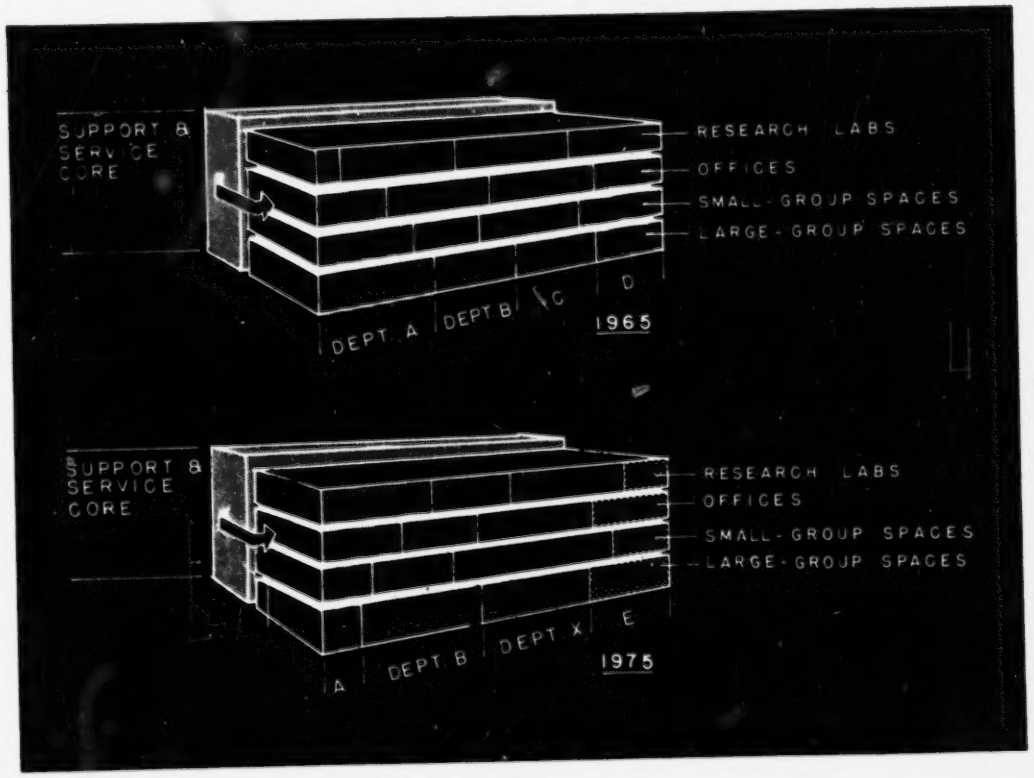
TABLE B

THE MEDICAL SCIENCES (UNIT B) INCLUDES:

1. Classrooms and laboratories for the required courses in the six basic medical sciences (100± students each).
2. Classrooms, laboratories and seminar rooms in varying sizes for non-medical students and graduate students and for medical electives.
3. Faculty and graduate student research laboratories.
4. Support and service facilities—receiving, storage, shops, preparation, stock rooms, animal quarters, hot and cold rooms, special equipment areas.
5. Teaching museums.
6. Departmental office suites and faculty offices.

(estimated net space requirements, The Medical Sciences Unit: 139,000 square feet)

FIG. 3. Schematic—The Medical Sciences (Unit B) provides a vertical arrangement of departments. Large classrooms, with their heavy traffic, are located on the lowest levels, offices and research laboratories on upper levels. Flexibility of departmental assignment is indicated by the changes shown in 1965 and in 1975. A support and service core runs the length and height of the building and serves the entire unit (see Figure 4).



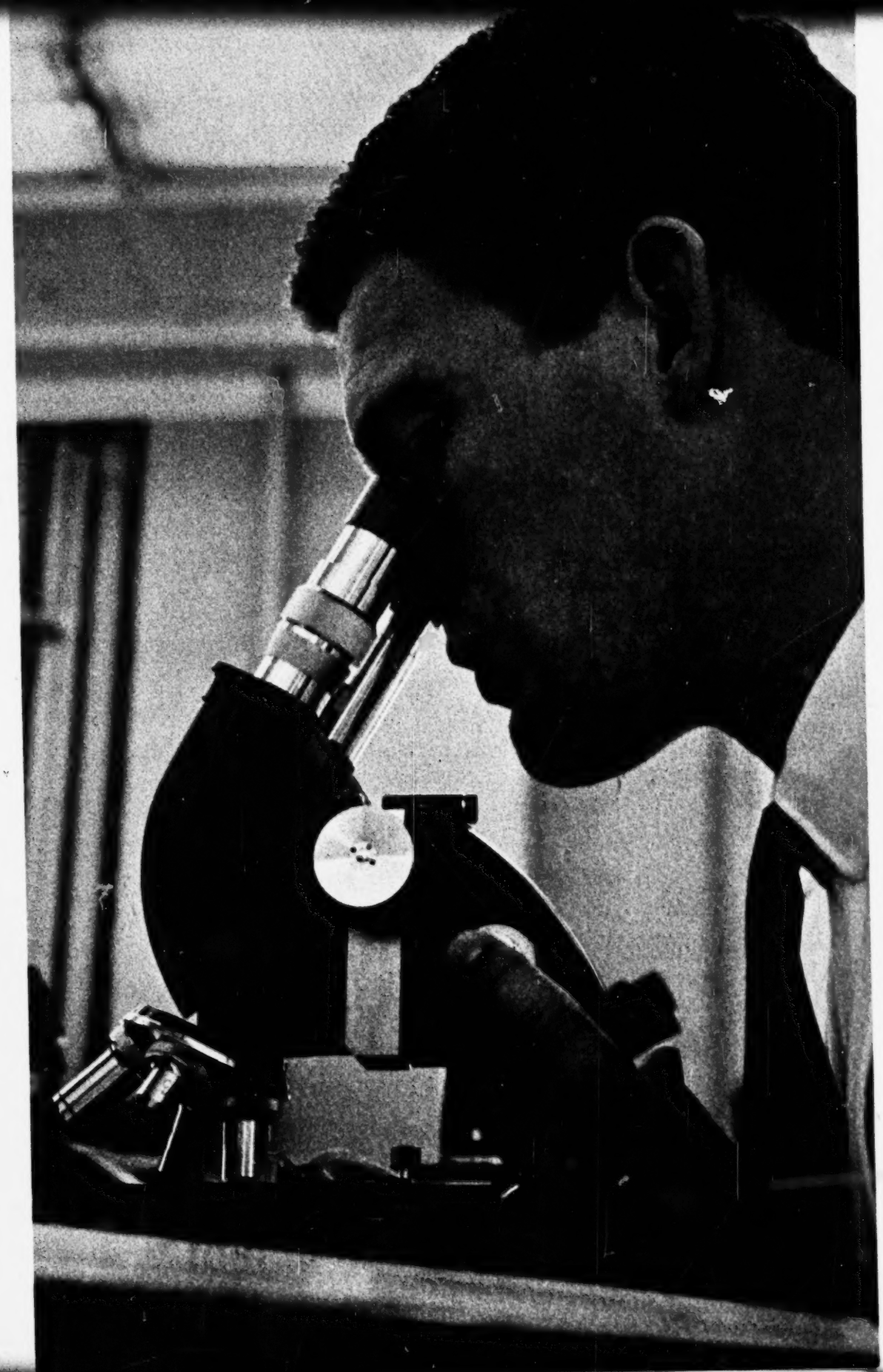


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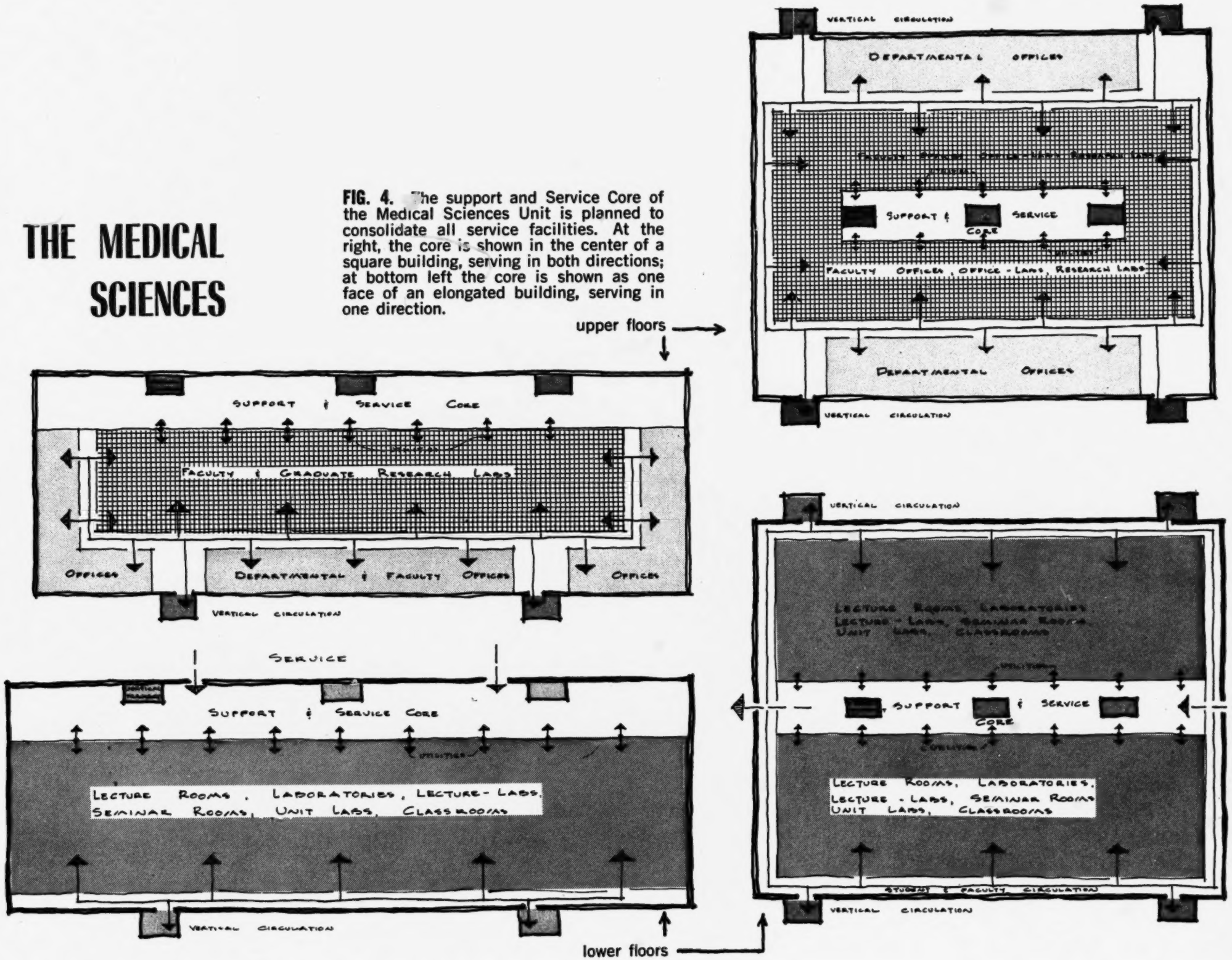
FIG. 4. The support and Service Core of the Medical Sciences Unit is planned to consolidate all service facilities. At the right, the core is shown in the center of a square building, serving in both directions; at bottom left the core is shown as one face of an elongated building, serving in one direction.



DEPARTMENTAL VS. MULTIDISCIPLINE LABORATORIES: THEORETICAL CONCEPTS

Traditionally most of the medical student's class time in the basic sciences is spent in laboratories and the remainder in lecture halls and seminar rooms. The design of the laboratory varies from discipline to discipline depending on what the student does—in anatomy he stands at a table to carry out his dissection; in pathology he sits at a desk to use his microscope; in biochemistry he stands at a counter and sink to manipulate glassware and reagents; in physiology he stands to conduct animal experiments using elaborate monitoring apparatus. This specialization of function has resulted in most schools adopting the "departmental laboratory" approach, with each department being assigned a laboratory designed to meet its particular instructional needs. Lecture halls and seminar rooms shared by several departments complete the system of facilities for basic science instruction in most medical schools. However, within the last decade or so, several new concepts have been introduced, among them the "unit laboratory" and the "multidiscipline laboratory."

At this point certain terms should be defined. As used here, "whole-class-laboratory" designates a single large room housing a laboratory function for a whole class, and "unit laboratory" signifies an arrangement of smaller rooms, each of which houses a part, or unit of the class. As used here, a "departmental laboratory" is one which is assigned permanently for the sole use of a single department; conversely, a "multidiscipline laboratory" is one which is shared by two or more departments.

Obviously the simplest functional arrangement is the whole-class-laboratory assigned permanently to a single department. In an emergency, such a laboratory can be manned by a single teacher. All students receive identical instruction at the same time. Set-ups and demonstrations can be arranged, as may be most convenient to the department, from adjacent stock rooms. Furniture design and equipment arrangement can be optimum for the function to be served. Clean-up and maintenance can be closely supervised since there is only one "boss." Schedule changes are easily accomplished without the possibility of conflict.

The disadvantages of the whole-class-departmental laboratory are not numerous but they are serious. Most importantly, the instructional process is apt to suffer from a lack of personal attention. Secondly, such a laboratory may be occupied less than half-time for four months of the year and be entirely idle for the other eight. This is very small use from a large facility which has been expensive to build, equip and maintain.

The unit-departmental laboratory tends to overcome the first disadvantage but does not meet the second. With the unit design, the student-teacher ratio is lower, and conditions for learning are generally better, except that it is not possible for a single teacher to communicate face to face with all students at one time. Units usually consist of 12-16 students, but may be either smaller or larger. When the units are small, so many teachers are required that staffing may present a problem, and division of equipment and demonstration materials between the various units may be both wasteful and time consuming.

The other contrast to the whole-class-departmental laboratory is the whole-class-multidiscipline laboratory. This has two groups of advocates. One group uses this arrangement to support the interdepartmental approach to instruction; there is no sharing of facilities in the ordinary sense, since the departmental structure has largely disappeared.* The other group advocates the multidiscipline or

* Spillman, Edra, "The Multidiscipline Laboratory," Alumni Bulletin, School of Medicine, Western Reserve University, XXI: 6-9; 1957.

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shared laboratory for reasons of economy—smaller outlay for space, laboratory benches, equipment and services.

Necessarily there is some limit to the sharing of facilities. The gross anatomy laboratory cannot reasonably serve any other purpose. The biochemistry laboratory, with its high (36″) benches and reagent shelves, is not very satisfactory for any other use. Pathology can conceivably share laboratory space with microbiology or histology, since all these courses are heavily oriented toward the microscope and generally require sit-down type (30″) benches. Physiology and pharmacology are probably the two medical school departments most commonly sharing student laboratory facilities; in both of these disciplines animal experiments are frequent, and vital functions are measured and recorded.

Sharing of laboratory space is sometimes effected on a morning-afternoon basis, but this brings real problems of supply and servicing. An alternate-day sharing is more feasible, but this, too, may make problems in connection with the use of large pieces of equipment. Alternate-semester sharing is the most satisfactory relationship. Even this may have its difficulties, since sharing tends to freeze the time-table of instruction to certain fixed relationships. In any sharing arrangement there is likely to be a need to move and store certain major items of equipment. In some instances this need for storage space may almost equal the space saved by sharing, thus making sharing ineffective as an economy measure. Shared benches and equipment are apt to represent a compromise between the needs of the two departments, not wholly satisfactory to either.

Seeking the best of each system, some schools have adopted the multidiscipline-unit laboratory, in which a small work area is assigned to a group of students for a whole term or year, and serves them for several courses, as Physiology and Microbiology. This arrangement has the advantage of small group teaching and the economy of high use. In addition, each student in this arrangement has a reasonably quiet "home base" that is his alone, and can theoretically be used at any time, day, night or week end. Since each student is usually assigned two benches, one for stand-up work and the other for sit-down work, the multidiscipline unit laboratory does not ordinarily save any space when compared to the departmental laboratory.

At The George Washington University School of Medicine, the faculty is committed to a strong departmental organization for instructional purposes. There is no wish to share student laboratories on a long-term basis, because of the restrictive features that are inherent in sharing. The departments have chosen, instead, to increase the utilization of their laboratory spaces by teaching each course twice in a twelve-month period, in effect sharing their laboratories with themselves.* Having attained a double utilization by this means (doubling enrollment without adding significantly to the requirements for instructional space), each student laboratory can be designed and equipped for the specific functions to be housed.

LARGE-GROUP INSTRUCTIONAL FACILITIES

Each basic science department presents its major course to a class of about 100 students. Usually a one hour lecture precedes a 2-3 hour laboratory period. In GW's present buildings, and in most medical schools, the lecture is given in one hall, and at the end of the lecture the students go into the laboratory which may be on the same or another floor. Thus each department conventionally uses two large-group facilities, each on a limited schedule. If a way could be found to house each department's lecture and laboratory course in a single

* This plan will be made effective when the new School of Medicine is constructed.

facility, there would obviously be a significant saving, both in initial construction costs, and in annual janitorial and maintenance costs. There might also be an improvement in the instruction, since the teacher would not be bound categorically to a sometimes artificial separation between lecture and laboratory.

The "Lecture-Lab"

In the designs shown herein, the "Lecture-lab" is a double-purpose facility, eliminating the need for a separate lecture hall, and also providing a high degree of flexibility in teaching methods. Since all benches are oriented toward the front of the room, lecture and demonstration can be strategically paced with laboratory work, changing back and forth at will.

The instructor may use slide, film and overhead projection, closed-circuit television, chalkboards and tackboards. Up to three projected images may be displayed simultaneously—the overhead or micro projector on the front-projection screen, and a combination of two projectors on the rear-projection screens. The rear screen projectors are remotely controlled by the instructor at the front of the room. These projectors can be loaded and readied by technicians in the support and service core, even when another class is in session.

Course materials in the form of specimens, photomicrographs, diagrams and models may be displayed within the room for small group discussions, individual student reference and practical examinations. After use, the materials may be returned to the teaching museum for further student reference.

SCHEME A (Figure 5) indicates a plan for a "lecture-lab" where the principal laboratory work is done with the student seated at a desk using his own microscope, and this is supplemented by demonstration of specimens from the museum. The room is particularly suitable for pathology, histology, and embryology.

The key to the room design is the use of continuous work counters 30 inches high, with fixed, pedestal-type, rotating seats arranged along their length. The seats are spaced three to four feet apart giving each student a desk-top working area of 3 to 4 feet by 18 inches. Each student has access to a storage drawer for his slides and microscope. The back to back spacing of 54 inches between counters provides more than adequate room for students going to and from their seats and for faculty members working with individual students.

The seating is arranged on three platforms for improved viewing of the various display surfaces at the front of the room (see Section A-A of Figure 5). No student is further away from the screen than seven times the width (7w) of any one image (the image width in this scheme is eight feet) and most students are within 6w. Conversely, no student is closer than 2w. The edge of the viewing area is determined by angles taken from the extreme edges of the central display surfaces. The plan illustrates angles of 35° which are minimum for good viewing conditions. Depending on the screen surfaces, the type of projectors, and the detail of the projected materials, these angles might be increased to 40° or 45°. However, a much less intimate room would result since the students in the rear would be farther removed from the front of the classroom.

The ceiling and front walls would consist of hard, reflective surfaces for sound distribution, and the rear walls would be covered with absorptive material to prevent unwanted reverberation. The intimacy of the room coupled with proper acoustic design would make amplification of the instructor's voice unnecessary.

Lighting is an exceptionally important consideration. The system must be capable of varying levels of illumination, should be directional to prevent spill on screen surfaces, and should be capable of being remotely controlled. A carefully integrated system

SCHEME A

FIG. 5. A Lecture-Lab with adjacent teaching museum for Pathology, Histology or Embryology (Scheme A). This room is planned to accommodate 100 students for lecture and note-taking, and for laboratory instruction oriented toward the use of the microscope (see plan, upper right). The front of the room (Section B-B, lower right) is organized for the use of instructional aids. Other details are shown in Section AA and in the view of instructional area.

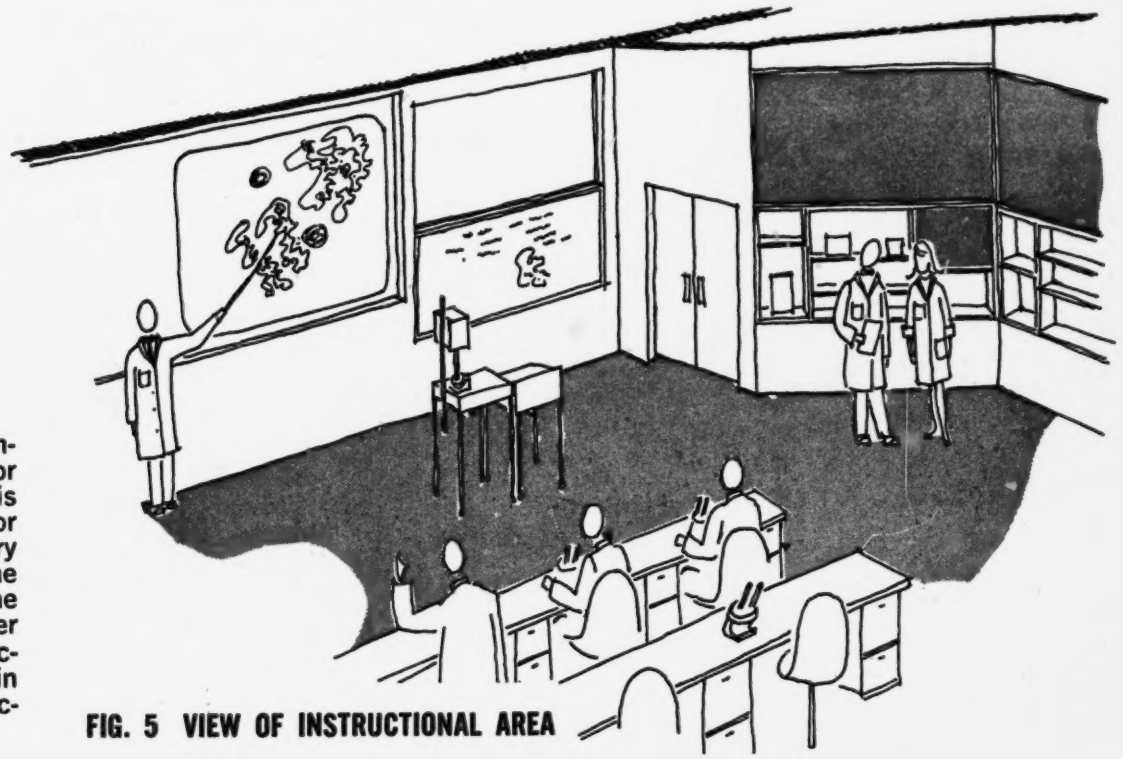

FIG. 5 VIEW OF INSTRUCTIONAL AREA

employing both fluorescent and incandescent fixtures will be best.

Being windowless, the room must be completely air-conditioned, including heating, cooling, ventilating, filtering and dehumidifying.

Of great importance to the proper functioning of this room is the inclusion of the necessary facilities in the support and service core. The actual definition and extent of these facilities will depend on the course involved.

The teaching museum is shown adjacent to the lecture-lab. To complete a department's instructional facilities, conference and seminar rooms and small demonstration areas should be provided; these should be located on the floor immediately above.

SCHEME B (Figure 6) is for a different type of "lecture-lab," in this instance planned for laboratory functions oriented to the use of reagents, utilities, and sinks, and to the manipulation of test materials. This laboratory is especially suited for biochemistry, microbiology and clinical pathology but could also be used for histology, embryology and pathology, and perhaps for other basic sciences. The proper functioning of the room depends on the development of a laboratory bench that is effective for experiments conducted while the student is standing, and yet is comfortable for the student when seated for lectures and microscopic study. The layout shown is based on the peninsula-type bench shown in detail in Figures 7-10.

The plan provides much the same instructional potential and flexibility as does Scheme A. The lecture and demonstration phase of the course work can be paced and presented in a logical relationship to the laboratory work. This eliminates the somewhat artificial break between lecture and laboratory which is required when students must move from lecture hall to laboratory. The instructor has a wide range of instructional aids that he may call on to

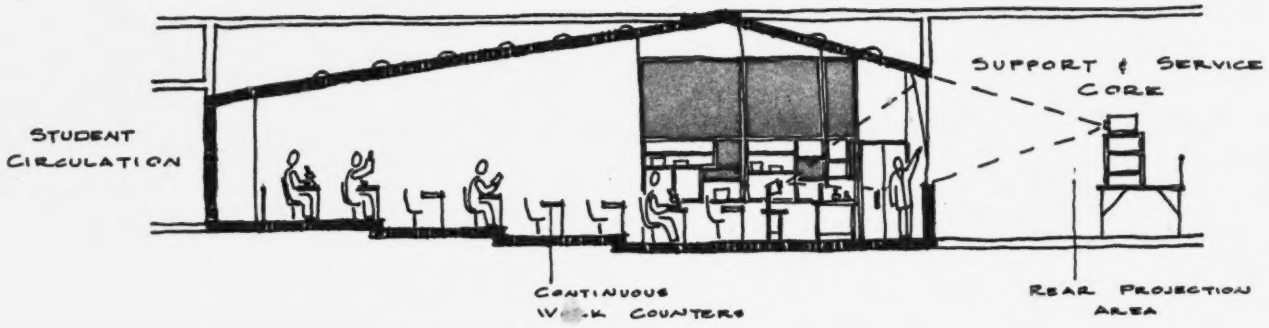

FIG. 5 SECTION A-A

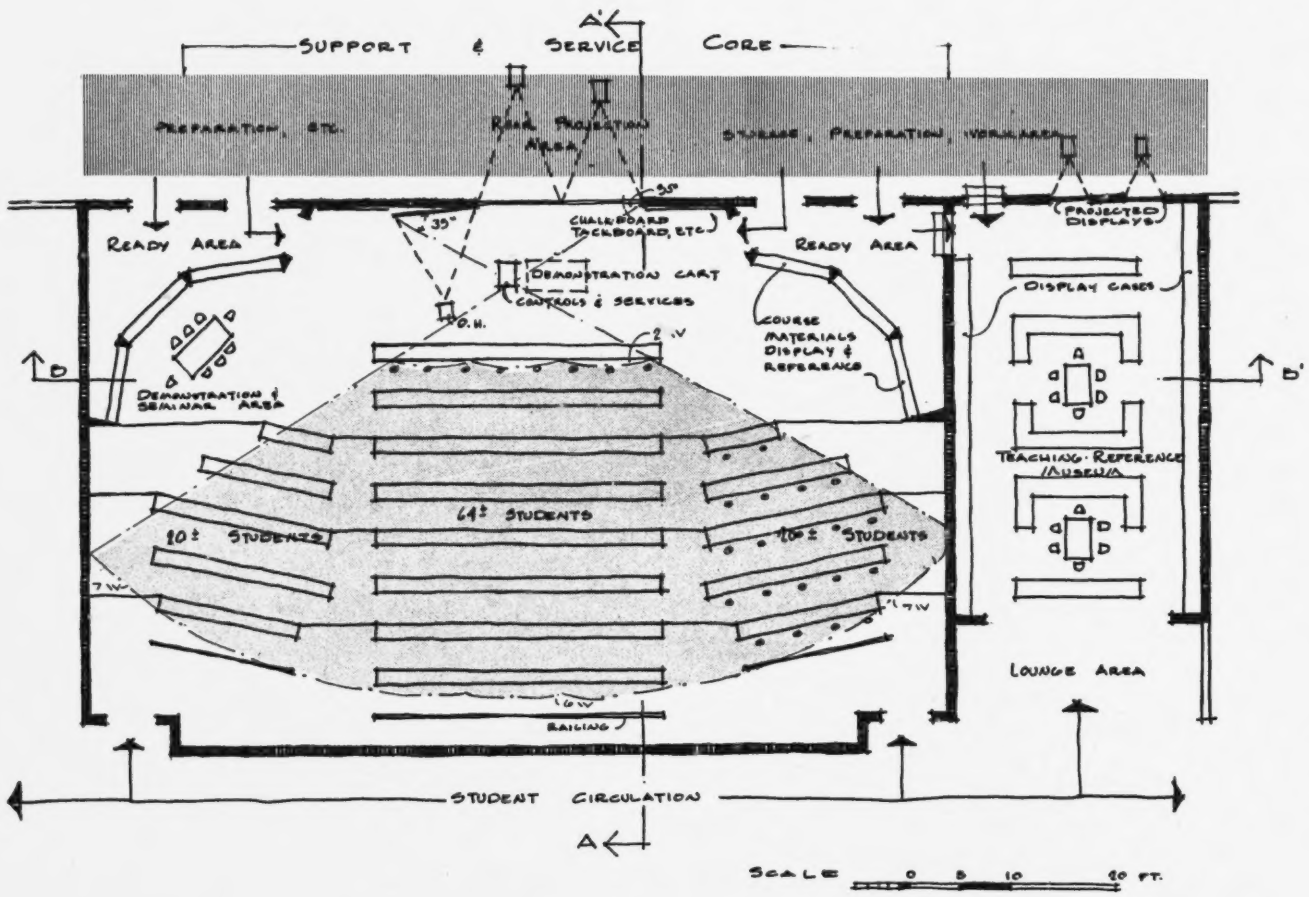

FIG. 5 PLAN

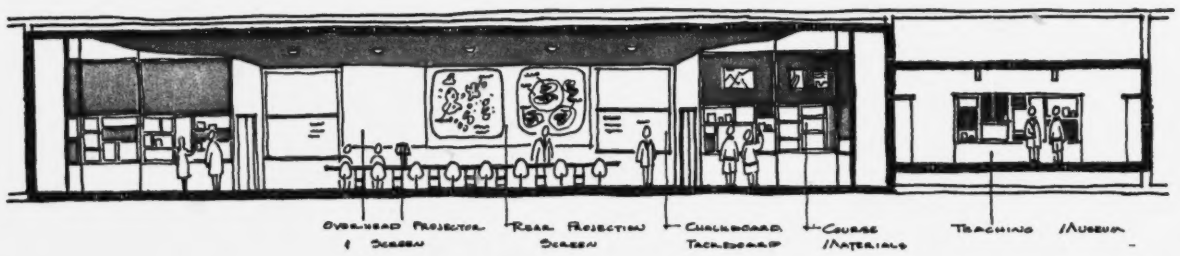

FIG. 5 SECTION B-B

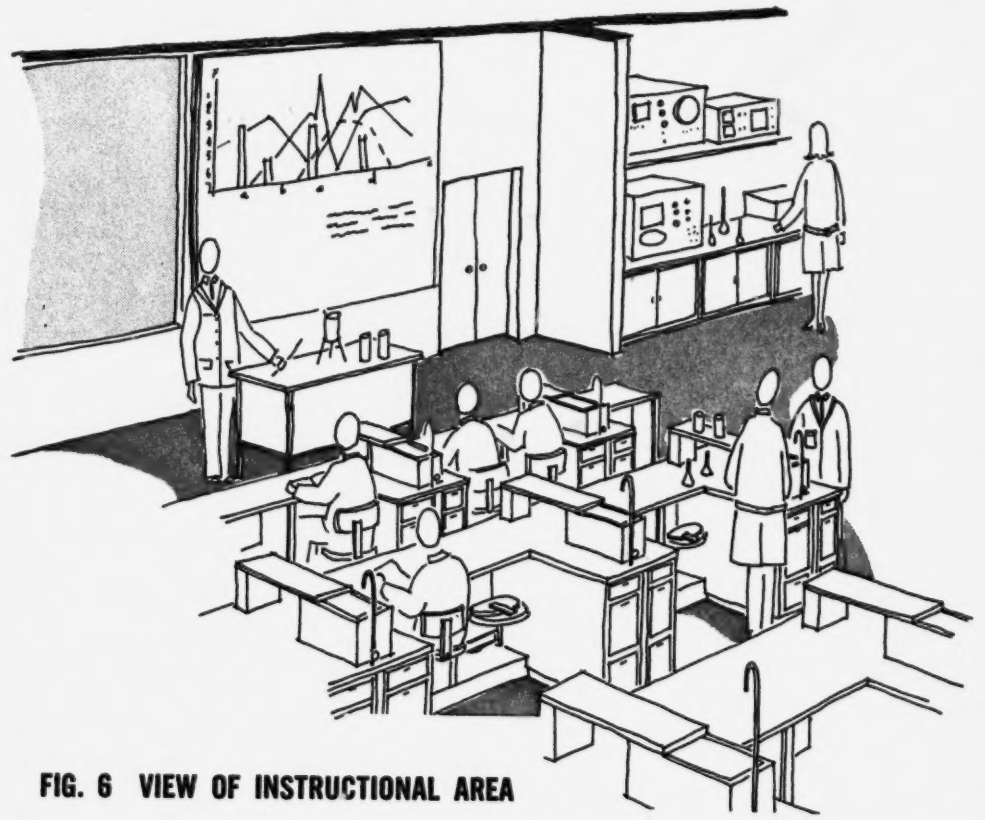

FIG. 6 VIEW OF INSTRUCTIONAL AREA

SCHEME B

FIG. 6. A Lecture-Lab for Biochemistry, Microbiology or Clinical Pathology (Scheme B). This area is planned for 100 students. The laboratory work requires extensive desk-top setups and their manipulation. The new peninsula-type laboratory bench (Type I in Figure 8) is illustrated. This bench doubles the storage space per student and permits two classes to share the room on schedule. A swing-out seat provides desk-like comfort for note-taking, but disappears under the counter when standing at the bench.

supplement his presentation. Of particular value would be the use of projected television to magnify the experiments and demonstrations the instructor is working with in the front of the class.

The room is arranged so that all students can see the instructor and the display surfaces at the front, can hear and be heard by the instructor, and can take notes comfortably during lectures. At either side and at the front of the room are special equipment and demonstration-discussion areas for small groups. Thus the instructor is able to work with the entire class, a small group of the class, or with individual students at the laboratory benches. The benches are arranged on four levels for improved sight-lines to the front. The benches fall within a viewing area defined by 2w and 7w based on nine foot images and edge angles of 35°.

In this type of course it is usually necessary for reagents and materials to be brought to each student station. This is accomplished by providing, at either side of the room, ramped service ways which open onto the various levels. Thus carts can be moved readily between the rows of laboratory benches, bringing materials from the storage and preparation rooms in the support core. The facilities of the support core are again of great importance. Depending on the disciplines utilizing the lecture-laboratory, the core may contain directly related glassware and reagent storage, reagent preparation, glassware washing, media preparation, cold rooms, hot rooms, and electronic measuring equipment.

The design considerations for acoustics and lighting are very similar to those for Scheme A. Because chemical materials involving dangerous and noxious fumes may be used in such a facility, special consideration must be given to ventilation and exhaust systems. Fume hoods would be required and could be located at the ends of the platforms and in the special equipment areas.

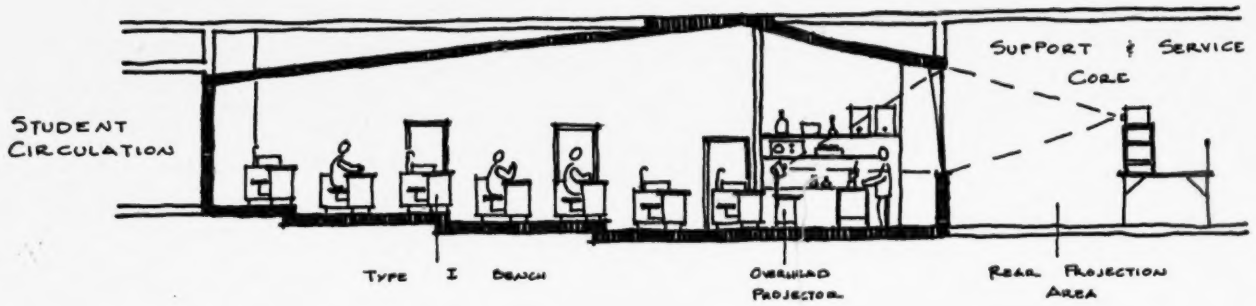

FIG. 6 SECTION A-A

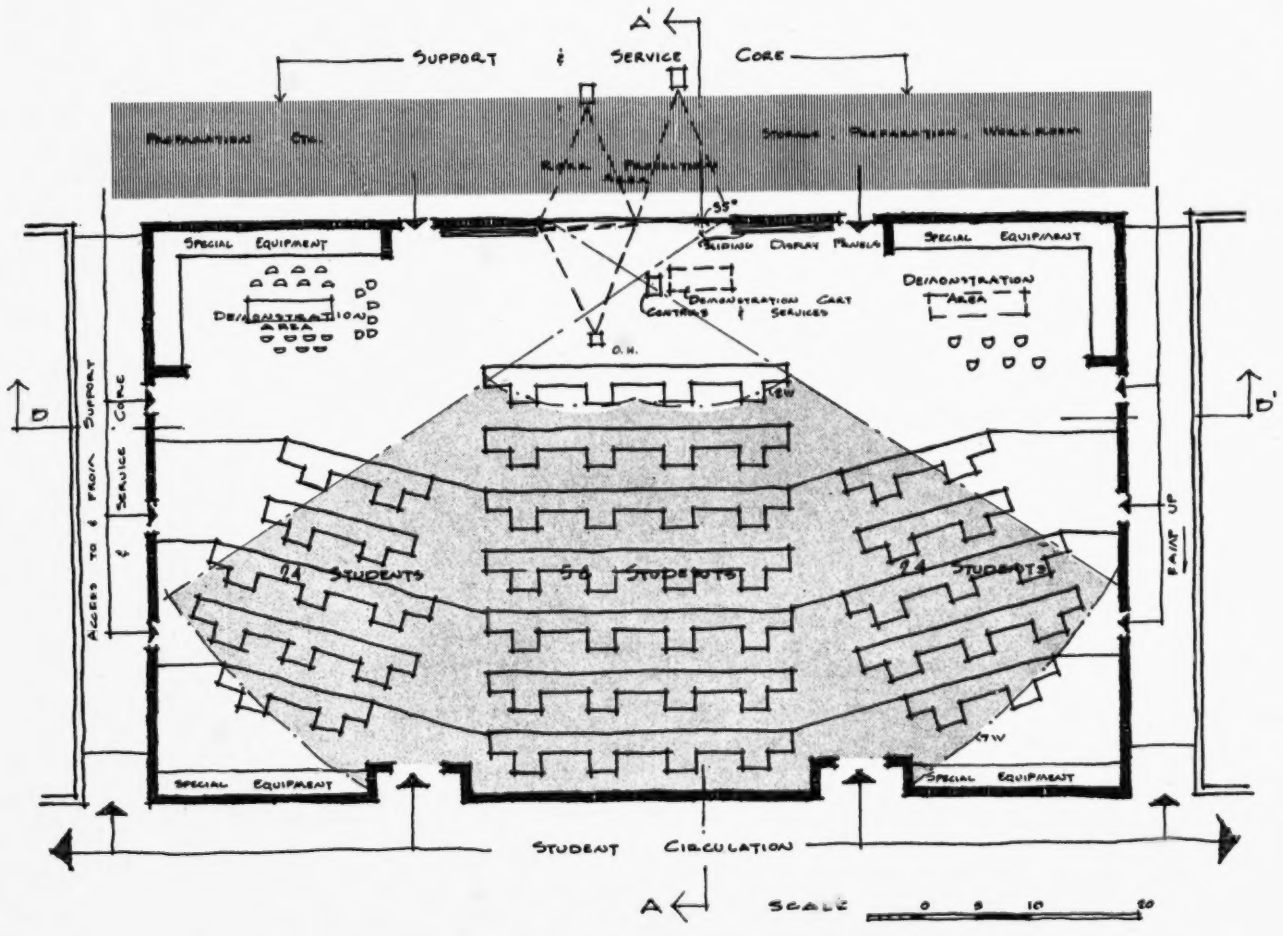

FIG. 6 PLAN

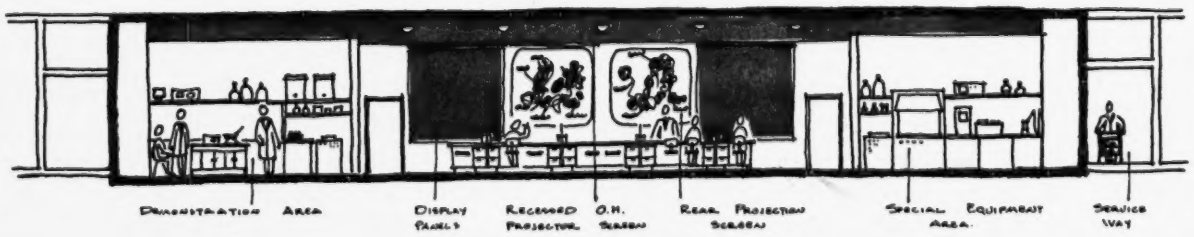

FIG. 6 SECTION B-B

Benches For The Lecture-Labs

The key to the success of the chemistry-type lecture-lab is a laboratory bench that is equally effective for stand-up work and for note-taking while seated. Conventional benches for student laboratories consist of double units back to back so that two rows of students face each other across reagent shelves. Since this design has no possibility of seating students faced toward the front of the room, it was necessary to work out new designs for the benches themselves. Three such benches were developed as a part of this study. One of each type has been constructed and installed in a small laboratory to permit evaluation of the practicality of the designs (Figure 7)*. The drawings (Figure 8) show a plan, elevation and section for each type.

FIG. 7. (bottom left) Mock-up of Benches for the Lecture-Lab. Three types of benches suitable for biochemistry or other basic science courses have been designed and constructed. Note the adjustable swing-away seats and the platform for the feet. The Type I or peninsula bench (center) is the most popular. Type II bench is at right, Type III at left. In regular use, these benches would be placed in rows as shown in Figure 6. The mounted seats make clean-up of the floor area exceptionally easy.

* A preliminary evaluation of these benches in an alcove at GW indicates general satisfaction with all three types; Type I, the bench of peninsula design, is the most popular. Unfortunately it was not possible to mock up a full-sized room; hence the evaluation is somewhat incomplete.

FIG. 8. (bottom right) Designs for the Benches for the Lecture-Lab. In Types I and II the sinks are mounted on top of the units, thus saving cabinet space below. Type I has double the cabinet space of the other two types. Type I has the reagent shelf parallel to the lines of vision. In each type the shelf is low and out of the way; utilities are placed beneath the shelf.

FIG. 9. (top page 23) The Peninsula-type Bench (Type I), Viewed from the Back. The back of the seat has been turned down and the seat swung into the bench, thus giving the student full use of his work area. Nearly 10 cubic feet of locked storage space are available for each seat, divided between 6 drawers. Half of these open to the back as shown, the other half to the next row of seats (see Figure 10).

FIG. 7

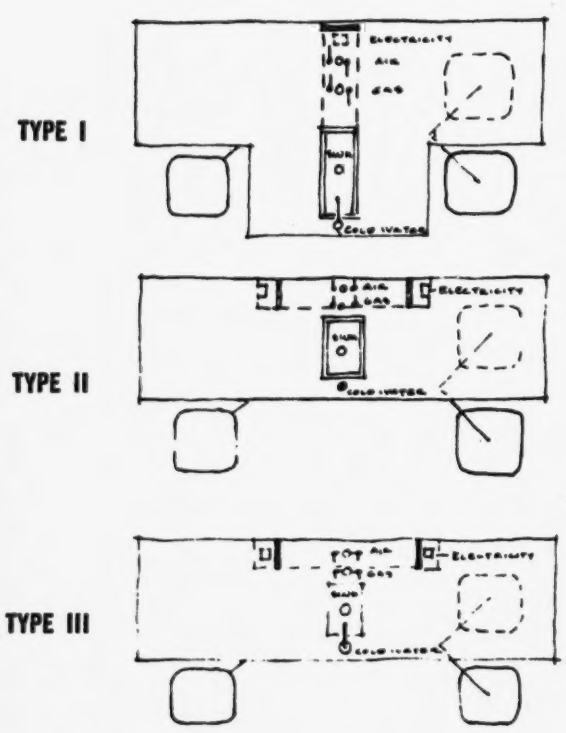

FIG. 8 PLAN

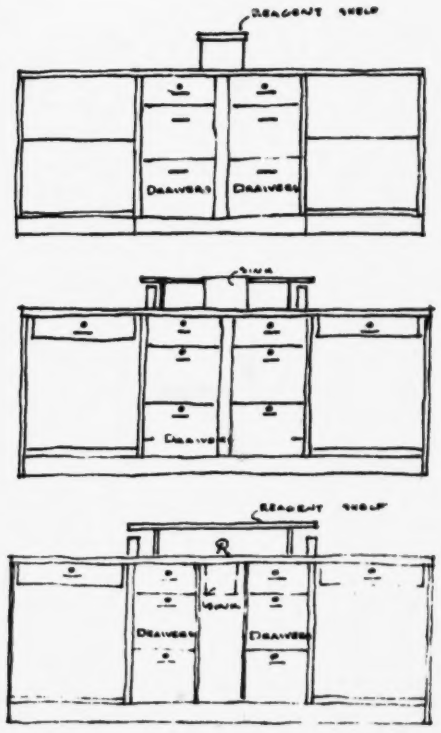

FIG. 8 ELEVATION

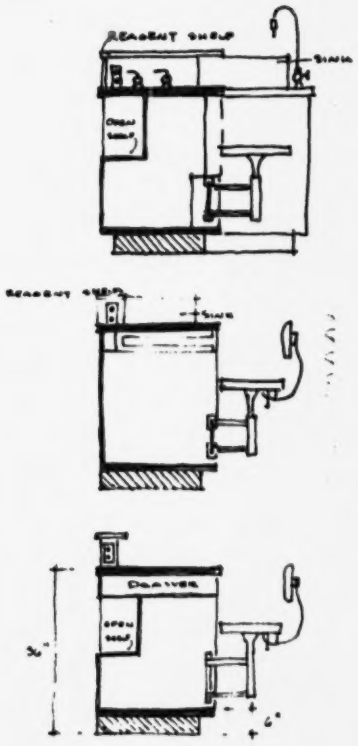

FIG. 8 SECTION

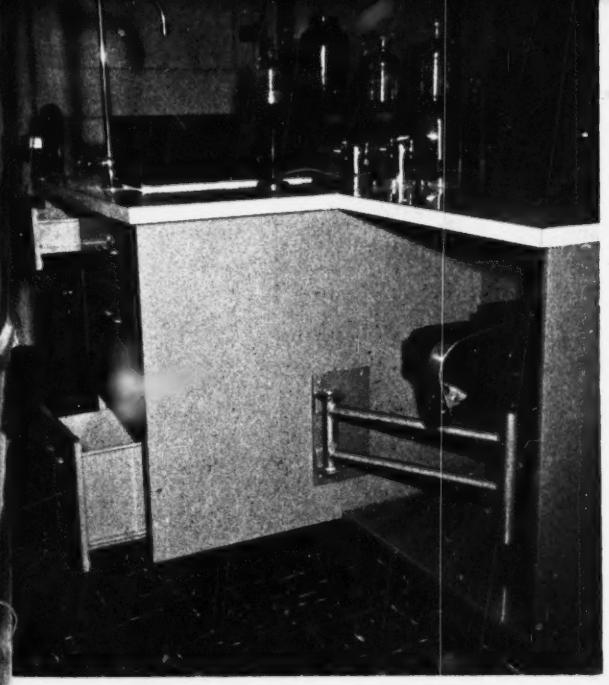

FIG. 9

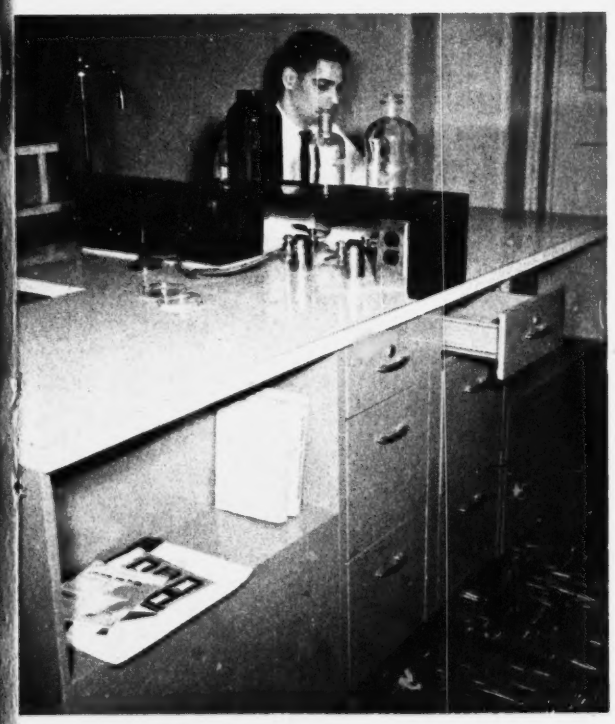

FIG. 10. The Peninsula-type Bench (Type I) Viewed from the Front. This shows the locked storage space and the open shelf available to the student in the next row. The work area for each student, exclusive of reagent shelf and sink, is approximately 9½ square feet, arranged in an L-shape.

Each type is designed as a two-place unit, with sink and reagent shelf to be shared by two students side by side. The counter top is 36 inches above the floor, this being the usual height for laboratory counters when work is to be done standing. Adjustable seats permit the students to sit comfortably, with feet on a platform raised six inches above the floor, thus simulating normal 30 inch desk height for note-taking and microscopic work. The seats fold and swing completely under the bench when the students stand to perform their experiments. Each type provides the student in the row in front with an open shelf for books or personal items.

Type I, the peninsula design, locates the sink, reagent shelf and utilities on the peninsula. The reagent shelf is located at right angles to the bench in order to give open viewing toward the front of the room. Type I has an additional distinctive feature: four sets of drawers, in pairs, back-to-back, are provided (see Figures 9 and 10). With this arrangement, two classes can use the room during the same term, and each group can have individual locked storage.

Types II and III are very similar to each other; both are straight-line units with two sets of drawers, and with shared sink, reagent shelf, and utilities. In type II the sink is on top of the counter as it is in the peninsula design, thus permitting wider drawers below; type III has a recessed sink.

Integrated Instructional Suites

SCHEME C (Figure 11) represents an instructional suite where lecture, demonstration and laboratory activities can be closely related, but are not accomplished at a single student station. Scheme C has been developed to provide work space for animal experiments and is planned particularly for pharmacology and physiology. With some modification it should be equally effective for gross anatomy.

The central area of Scheme C is a lecture-demonstration area providing student seating of typical spacing and layout for note-taking, but without work benches or storage facilities. The arrangement of the front of the area permits the instructor to make use of a variety of instructional aids. At the rear of the facility is a display area for reference materials and for small seminars.

The laboratory alcoves can be varied by changing the arrangement of the modular work tables and other equipment. The plan shows several of the infinite variations possible. If desired, each alcove may be set up with fixed laboratory equipment and the students can circulate through the various alcoves to accomplish a series of exercises. One or more alcoves may be set up as conference-seminar settings; others may be arranged and equipped for experiments involving small or large animals. Chalkboards, tackboards and television monitors may be located in each alcove to provide step by step instruction for small groups.

The support and service facilities located in the adjacent core area are of vital planning concern. The exact definition of the facilities, equipment and services required for the proper functioning of this integrated suite is a function of the particular discipline utilizing the room. It is unlikely that two disciplines could share this facility in the same term.

SCHEME D, and its alternate, show instructional areas similar to those in Scheme C, but arranged in such a way that the lecture area can be shared by two or more departments. As shown (Figure 12), the laboratory area is placed at one side of the lecture area; by reproducing the laboratory area on both sides of the lecture room, it may be possible to satisfy the needs of two departments.

The D (alternate) plan has a larger floor area than the others and should be useful for anatomy. If the scheme A "Lecture-lab" is substituted for the lecture area of D (alternate), it may meet the entire instructional needs of the anatomy department, including gross anatomy, histology and embryology.

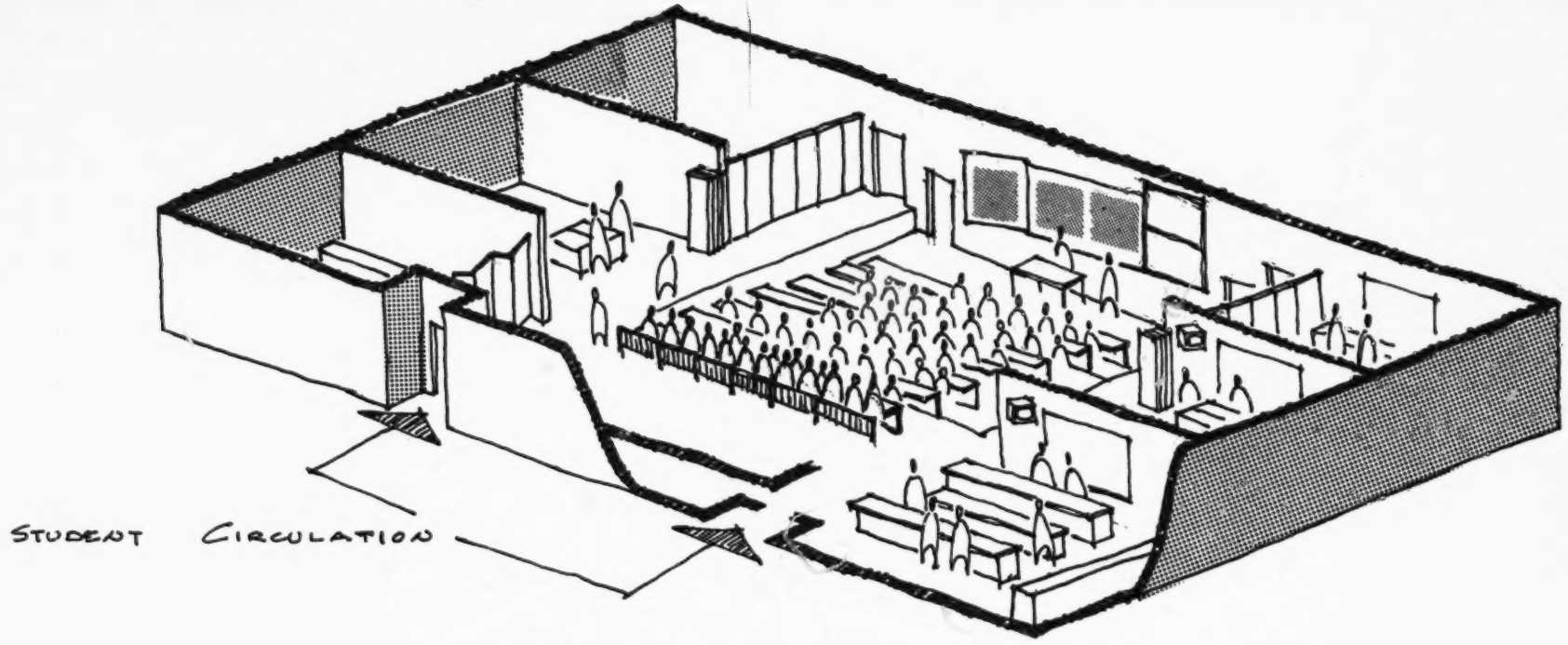

FIG. 11 ISOMETRIC

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SCHEME C

FIG. 11. An Integrated Instructional Suite (Scheme C) for 100 students in Physiology or Pharmacology. This suite is designed as a series of unit laboratories surrounding a central lecture area. All units may be set up alike, or different equipment may be set up in each unit and the students rotated through them on schedule.

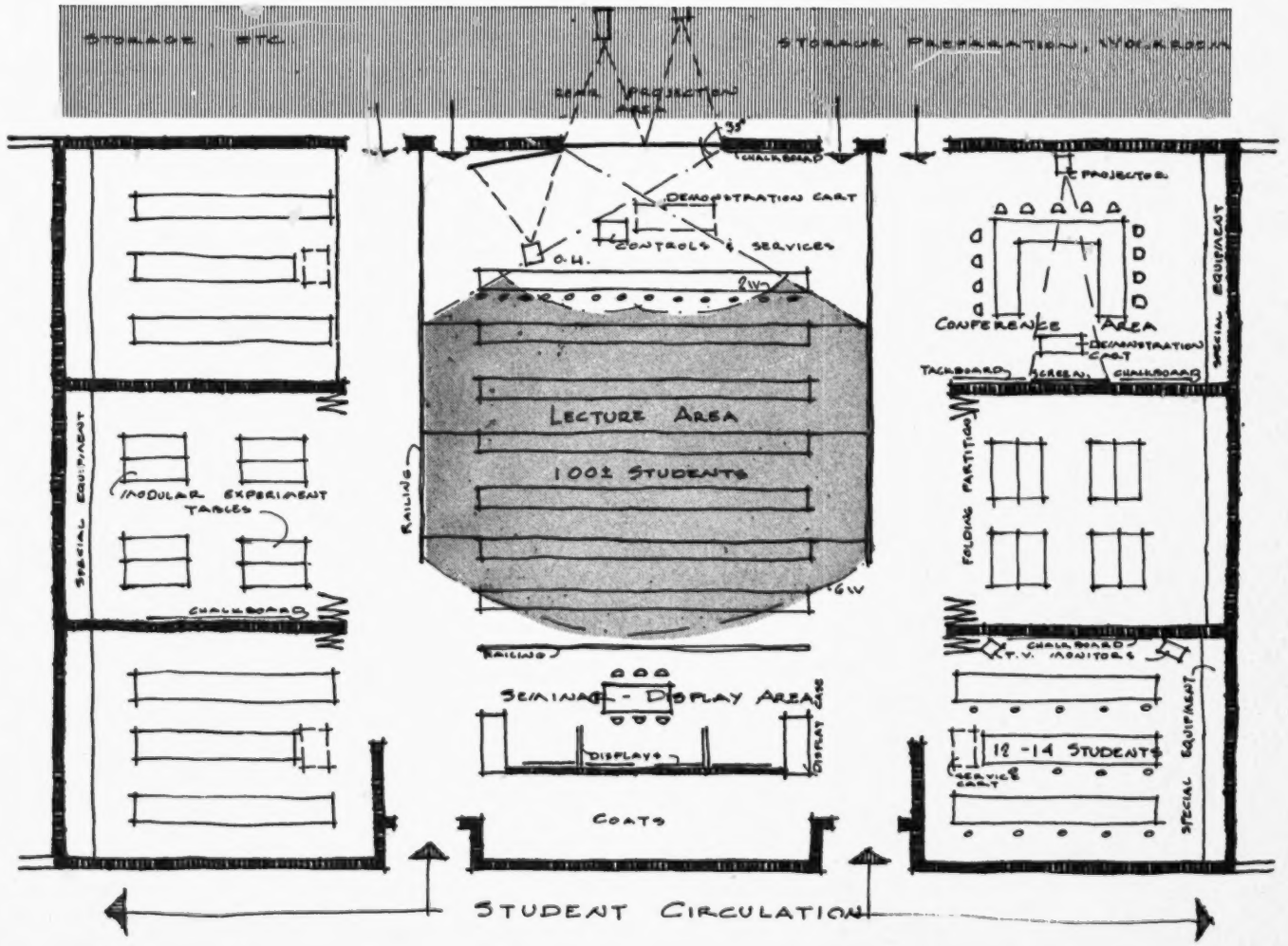
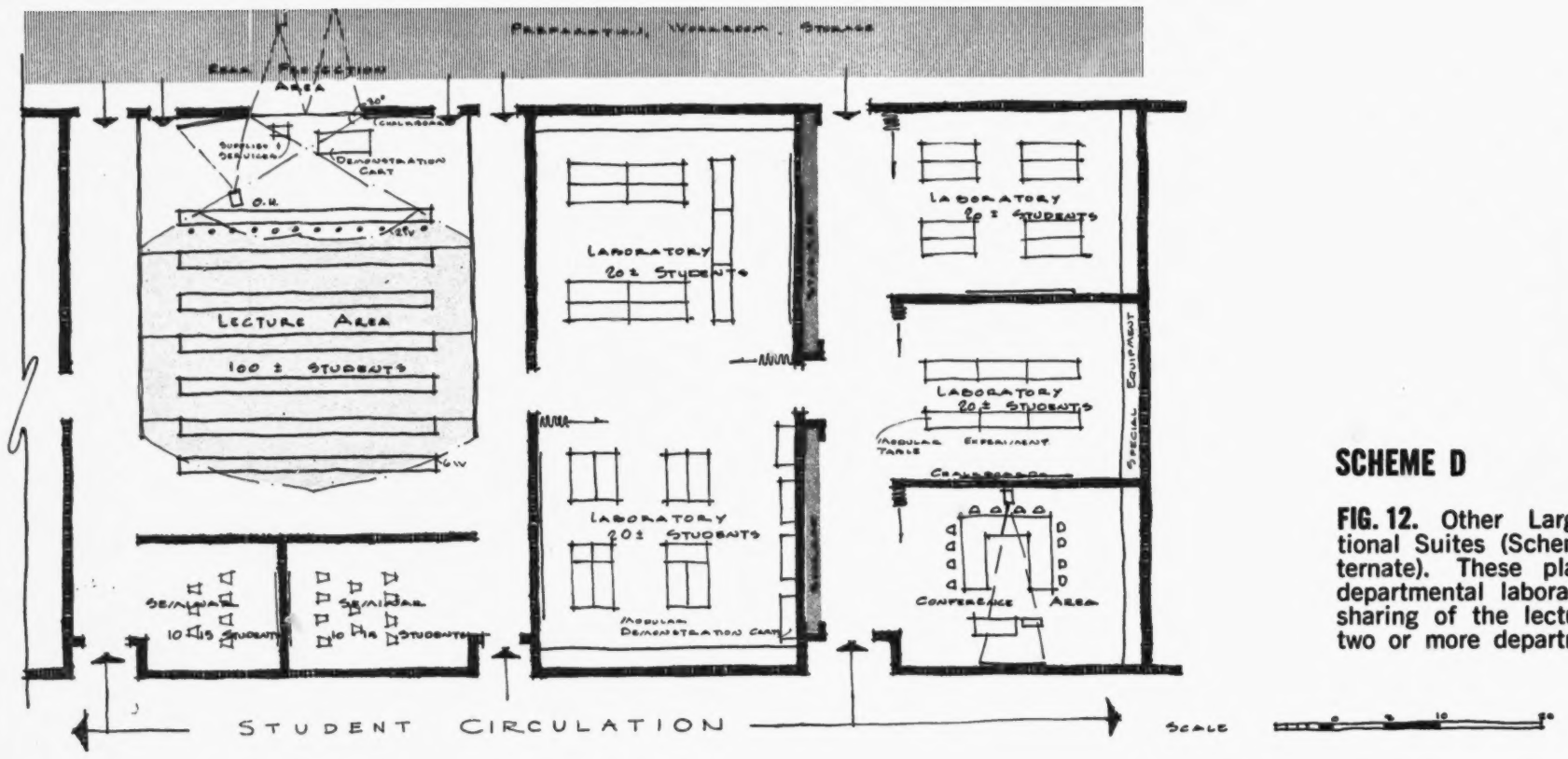


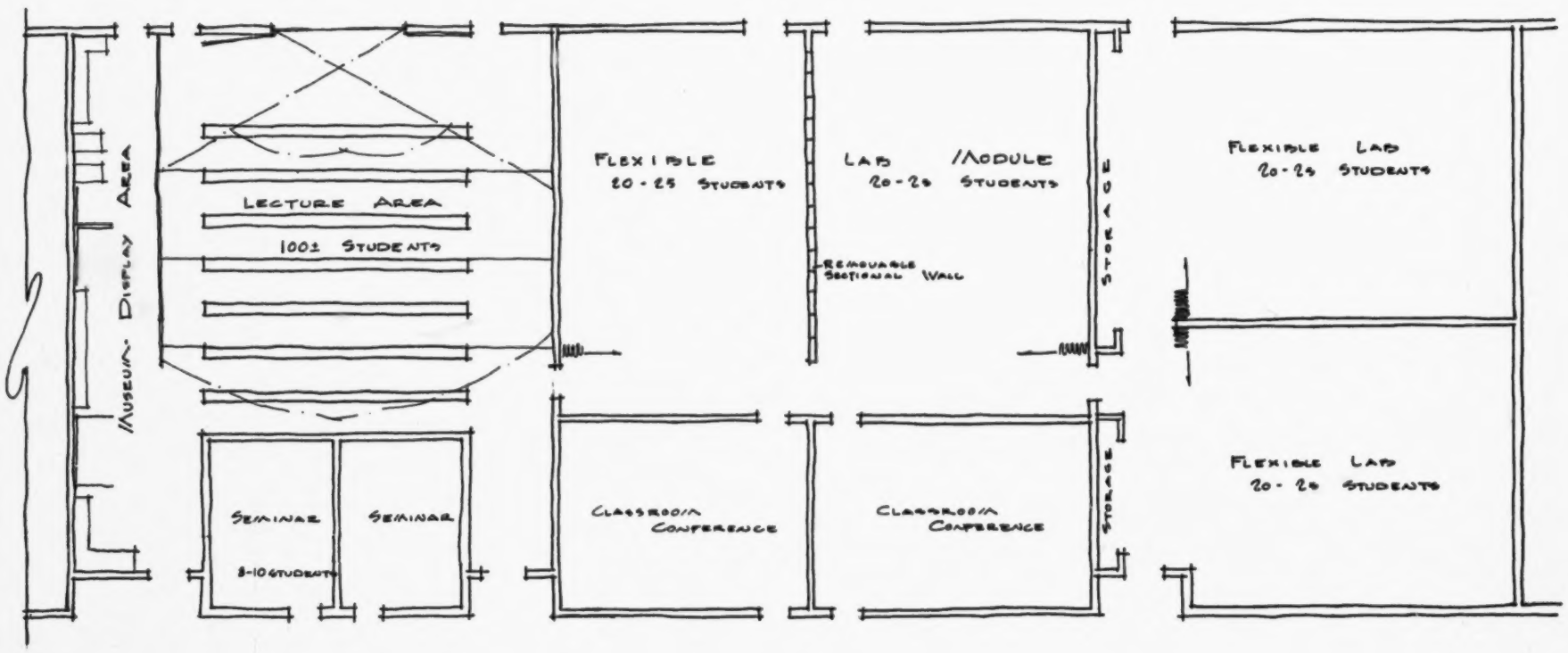
FIG. 11 PLAN

SCALE 0 10 20



SCHEME D

FIG. 12. Other Large-group Instructional Suites (Schemes D and D Alternate). These plans provide unit departmental laboratories but permit sharing of the lecture area between two or more departments.



SCHEME D ALTERNATE

SMALL GROUP INSTRUCTIONAL FACILITIES

Not all instructional activities of the basic science departments involve the whole class, and housing must be provided for smaller groups. Facilities are frequently needed where portions of the large medical class can meet for elective courses, seminars, conferences, special demonstrations, practical examinations, and a range of other instructional situations. Graduate students in the basic sciences require small seminar rooms and laboratories. These varied needs can be met by seminar rooms for 8 to 25 students, conference-classrooms for 25 to 40, and laboratories for 10 to 25. Some of these smaller rooms should be of the "lecture-lab" type, simply miniatures of those previously described for larger groups, including some oriented towards the microscope and others towards chemistry or animal experimentation. Unless special equipment and servicing are required, most of these rooms should be interdepartmental and assigned on an "as needed" basis. Most of these facilities should be located on intermediate levels of the Medical Sciences Unit.

FIG. 13. Instructional Facilities for Small Groups. Small classrooms and student laboratories such as these will be located on intermediate floors of the Medical Sciences Unit, and will ordinarily be shared by several departments. Note that direct access is provided to the storage and preparation area.

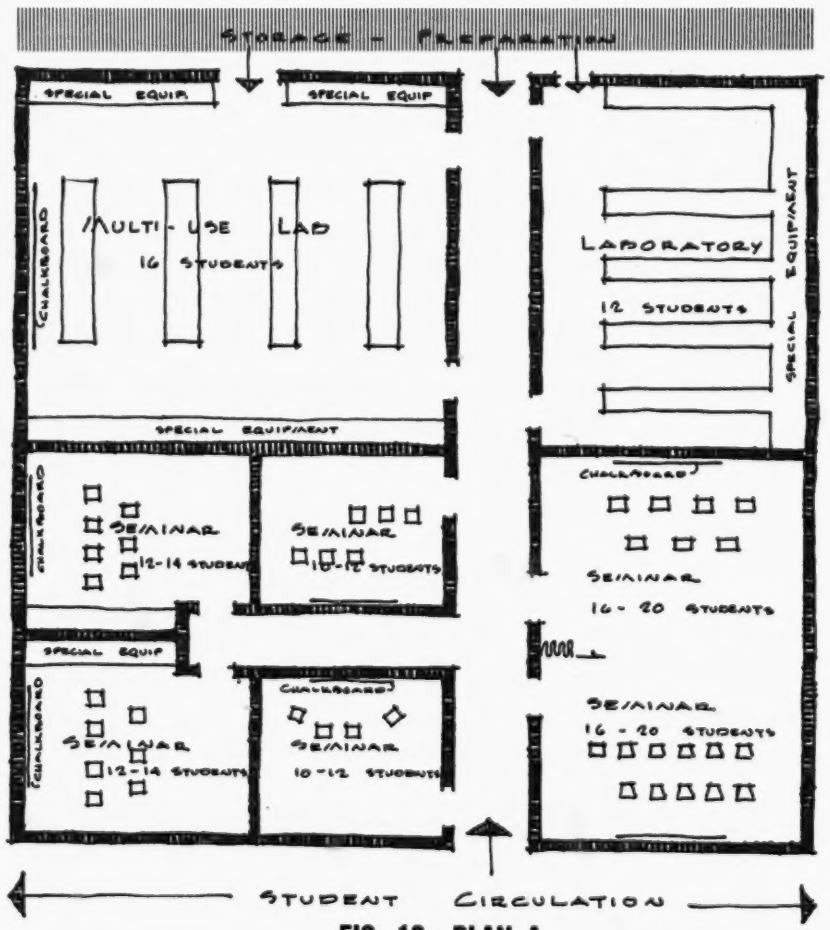


FIG. 13 PLAN A

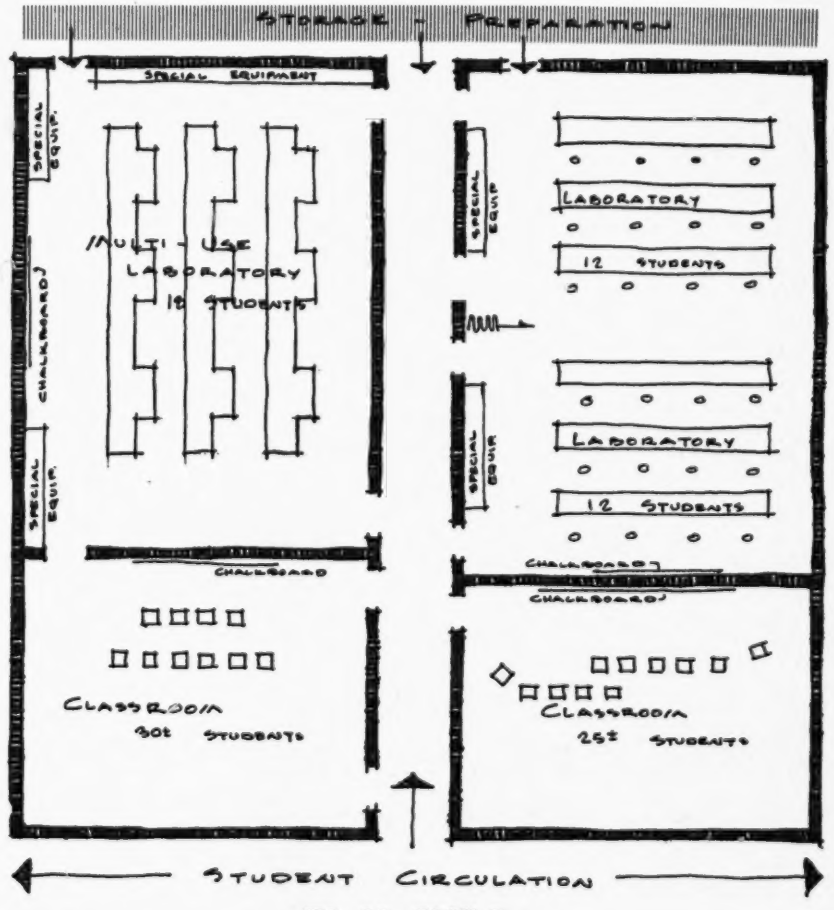


FIG. 13 PLAN B

SCALE

In some instances, small suites including both laboratories and classrooms may be required. Two such suites are illustrated here (Figure 13). In all cases the laboratories are positioned with direct access to the support and service core for necessary storage and preparation. It will be noted that in some cases folding partitions divide classrooms and seminar rooms to permit their use by different size groups.

FACULTY OFFICES AND RESEARCH FACILITIES

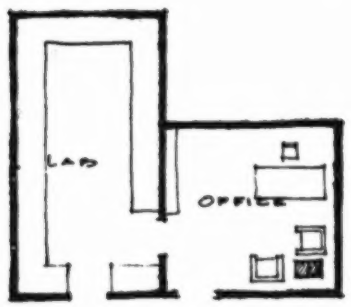
The matter of providing suitable faculty offices and research laboratories is not to be considered as an afterthought in planning facilities for the medical sciences, since the floor area required for these functions may equal the total floor area for student laboratories and classrooms.

For maximum economy and flexibility, the planner would suggest a grouping of research laboratories of similar design criteria, without regard to departmental designation, but this solution is not acceptable to the medical scientist and would probably be inefficient in operation as well. In the basic medical sciences the faculty is so much involved in research that an individual's office and his research laboratory are usually combined as a personal suite. This arrangement saves staff time and promotes the close relationship between investigator and technical staff which is most conducive to good research.

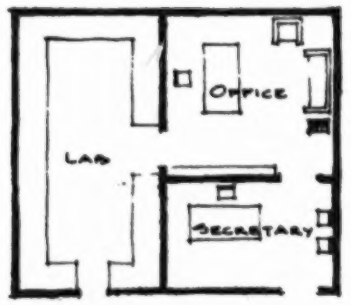
Graduate students in the basic sciences must also be given special consideration. Their research is usually closely correlated with that of the faculty. In some instances a number of graduate students will work together in a general research laboratory; in other instances the research project is individually assigned and housed. Office space should be provided in or adjacent to the research areas.

In order to study the needs of the basic science faculty at The George Washington University School of Medicine, a questionnaire was distributed to each department chairman. On the basis of returns from this questionnaire, a series of designs were developed, integrating office and research spaces. These designs are shown in Figure 14. (In the case of interdepartmental research projects, much larger spaces will be required. Since most of these are special facilities designed specifically for the work to be housed, they are not included in this study.)

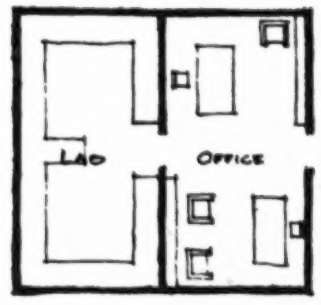
FIG. 14. Offices and Research Laboratories for the Basic Science Faculty. Six different arrangements are shown. Plan A is believed suitable for a young faculty member whose research activities are just beginning. Plans B and C include provisions for a secretary as well as the researcher and his technical assistant. Plans D and E are suggested for graduate students, combining desk and laboratory space in a single room. Plan F is a suite housing one or more basic scientists and their graduate students together with technical and clerical staff.



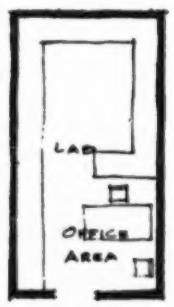
A 1 MAN OFFICE & LAB



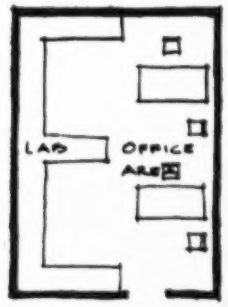
B 1 MAN OFFICE, LAB & SECRETARY



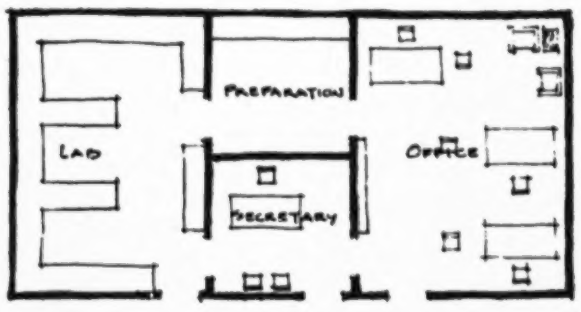
C 2 MAN OFFICE & LAB



D 1 MAN COMBINATION OFFICE-LAB



E 2 MAN COMBINATION OFFICE - LAB



F 3 MAN OFFICE, LAB, PREPARATION ROOM, & SECRETARY

THE RESOURCES

Unit C

The Resources Unit houses two major and overlapping functions, (1) support of the learning process by providing access for students and teachers to accumulated knowledge, and (2) support of the teaching process by providing facilities for development and production of instructional aids. Table C lists the facilities that will be required.

The areas devoted to the learning resources, with their heavier traffic, should be on the lower floors, readily accessible to all other units of the Medical Center (see Figure 15). Areas devoted to the development and production of instructional aids should be located on the upper floors, away from heavy traffic. Communication lines should be provided linking all units of the Center, so that closed circuit television programs originating in any unit can be received in any other unit.

All learning materials stored in the Resources Unit must be classified, catalogued and arranged in such a way that persons using the Unit are able to find the desired materials quickly and conveniently. This may be accomplished by vertical stacks surrounded by individual study cubicles to supplement the larger reading rooms. Some of the study cubicles should be equipped so that the student can study audio and visual materials privately, as he would use books. As automated systems for information storage and retrieval continue to evolve, the time may come when individuals need not go to the Unit personally, but will request and receive the desired information by remote, electronic means.

A plan for a typical learning resources floor is given in Figure 16. A zoning of this floor is suggested so as to encourage the use of the facility. Entrance to the floor is through a lounging area in which a certain amount of noise would be expected. Telephones and vending machines will be in this area, and a limited number of current journals will be placed here to encourage browsing. Doors will separate this area from the general reading room. Beyond the reading room the stacks will be located, surrounded by study, reference and review rooms designed to provide privacy when desired, or to permit group study.

FIG. 15. (top page 29) Schematic—The Resources (Unit C). The zoning of Unit C, as shown here, provides for the location of high traffic areas (i.e., reading rooms) on the lower floors, and low traffic areas (i.e., studios) on upper floors. Receiving and preparation areas related to periodicals are located in the basement. It would be desirable to have access from the Medical Sciences Unit at all levels, provided that suitable controls could be established.

TABLE C

THE RESOURCES (UNIT C) INCLUDES:

1. Medical library, including stacks for books and bound volumes of journals, current journal display areas, and catalogues.
2. Special areas for photocopying equipment and microfilm readers.
3. Facilities for electronic storage and retrieval of coded information in medical journals.
4. Reading rooms, individual study carrels, rooms for individual and group review of tape recordings and films, small conference and seminar rooms.
5. Receiving and preparation areas.
6. Studios and shops for production of video and audio materials, including films, tape recordings and exhibits.
7. Television studios and related engineering and control rooms.
8. Maintenance and storage areas.
9. Administrative areas.

(estimated net space requirements, the Resource Unit: 50,000 square feet)

FIG. 16. (bottom page 29) A Typical Lower Floor in the Resources Unit. Shown here is the ground level entrance to the main library area. An informal lounge at the entrance will reduce traffic and noise in the general reading rooms. Just beyond the lounge is the control area, including catalogues and indices. A vertical transport and administrative core runs the height of the building in this area. The open stacks extend vertically and are accessible to all lower levels from the reading rooms and study carrels.

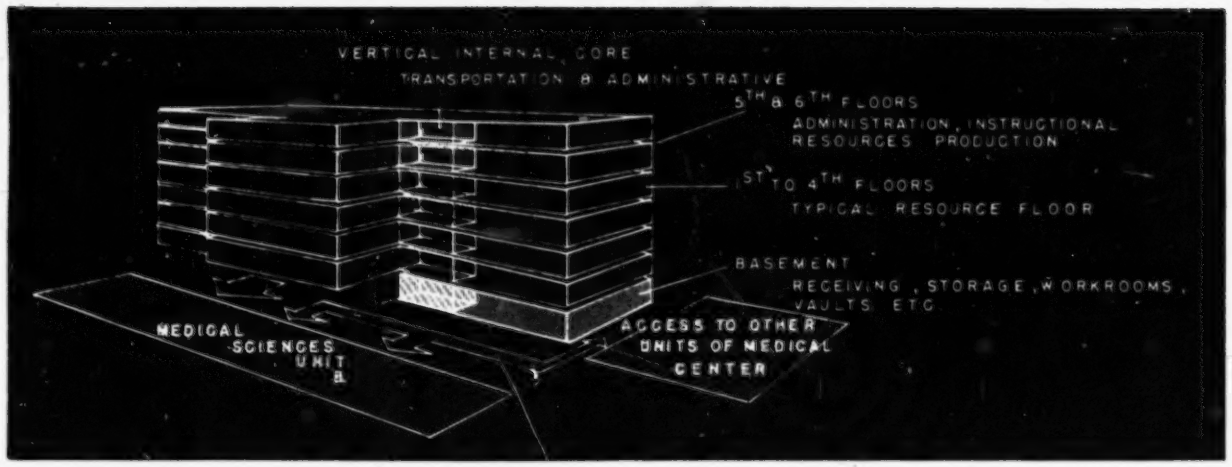


FIG. 15

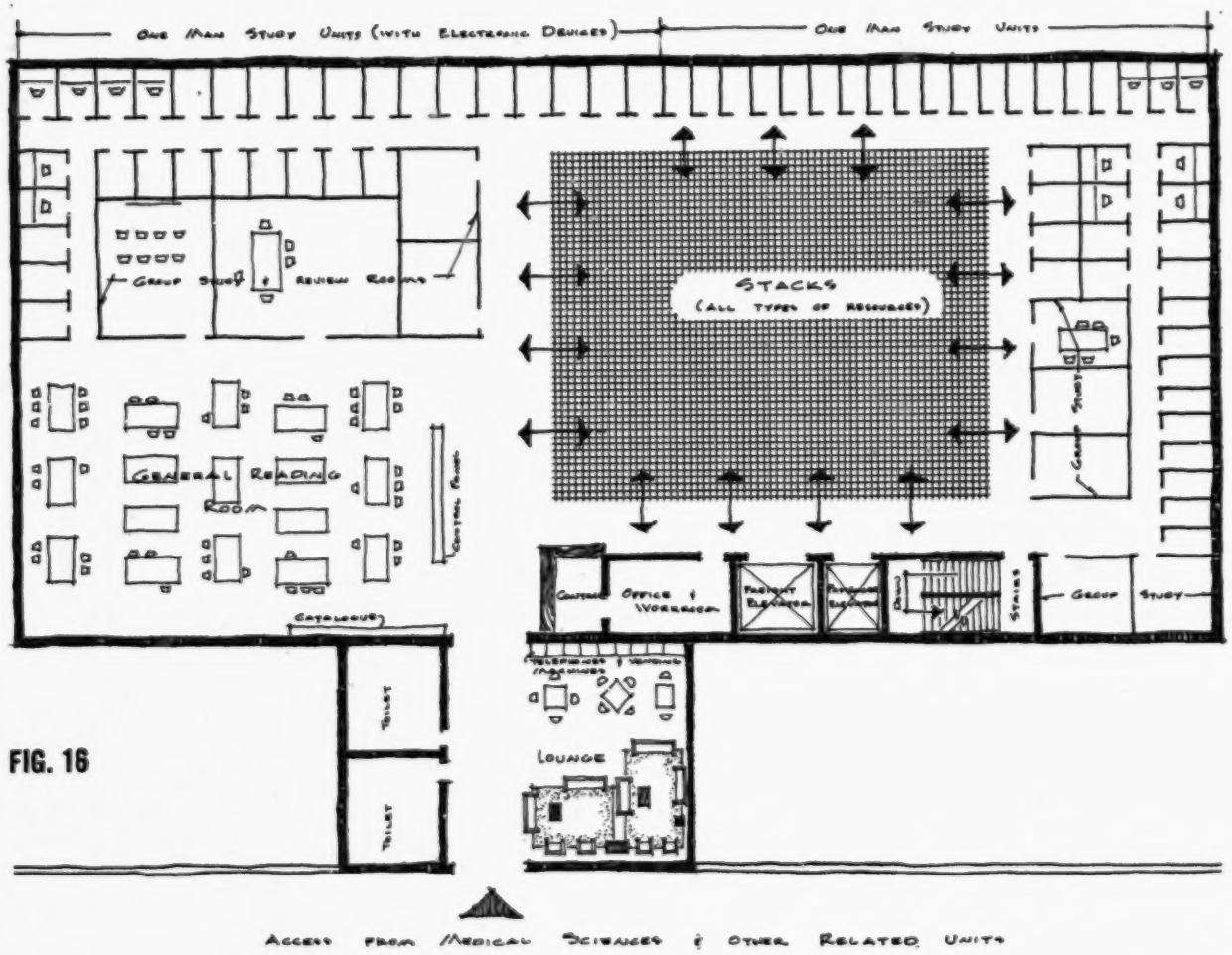


FIG. 16

THE UNIVERSITY CLINICS Unit D

This unit provides a setting in which the student learns health maintenance and health counseling, and improves his skill in the art of medicine. The more nearly the design and operation of this unit can simulate the best facilities and conditions for private office practice, the better it will accomplish the educational objectives for which it is primarily designed.

SCOPE OF FUNCTIONS

Three important activities take place in the University Clinics Unit. Here all ambulatory patients, whether indigent or private, receive their medical care except that of an emergency nature. Here certain essential teaching functions are centered, including the student's first instruction in clinical medicine in the Continuing Care Program and his final clinical experience in the Progressive Clerkship (see Appendix), as well as the intern's and resident's instruction in the medical and surgical specialties. And here important clinical research is carried out, especially in relation to chronic diseases. To provide suitable areas for these varied activities a wide range of facilities is necessary (Table D).

DEFINITION OF FACILITIES

Basic Clinic Suite

This is the area in which most types of ambulatory medical care are provided; it corresponds to a doctor's office suite except that facilities for several doctors are grouped together for more efficient operation. The basic suites are interchangeable between most specialties, and hence comprise a large part of the total space in the University Clinics Unit.

Specialized Clinical Facilities

These are also areas in which patients are seen, but which require special design considerations be-

THE UNIVERSITY CLINICS

cause of the nature of the work to be done, equipment required, or some other feature. Thus special facilities are required for minor surgery, electrocardiography, pharmacy, encephalography, endoscopy, application and removal of plaster casts, clinical pathology laboratory, diagnostic radiology, recovery room, otolaryngology, ophthalmology and pediatrics. The latter is specialized to permit isolation of children, and to provide furniture and equipment of a size and character consistent with the needs and comfort of children.

Administrative Facilities

These are the areas in which the day-to-day operations of the clinic are organized. Design considerations here are similar to those for non-medical institutions such as hotels, in which large numbers of people gather, are interviewed, served and dispersed. The following are some of the functions to be housed: information, registration, appointments, medical and other records, stenographic services, receiving payment, billing, control and supervision, and communications.

TABLE D

UNIVERSITY CLINICS (UNIT D) INCLUDES:

1. Consultation and examination rooms for ambulatory patients.
2. Specialized diagnostic and treatment facilities.
3. Pharmacy.
4. Clinical pathology laboratory for basic services, including specimen collection.
5. Radiology department for basic diagnostic services.
6. Receiving, storage, preparation and supply areas.
7. Administrative services, including spaces for patients, appointments, information, records, stenographic services, cashier and billing, communications, personnel, housekeeping and maintenance.
8. Instructional areas, including small and medium-sized conference rooms and student laboratories.
9. Staff areas, including locker and dressing facilities, lounges and showers.

(estimated net space requirements, University Clinics Unit: 59,000 square feet)

Support Facilities

Grouped under this heading are those areas necessary for the provision of certain non-medical services, and for the support of the educational functions of the unit. These include: receiving and storage; preparation and supply areas, including clean-up and sterilization; vertical transportation; personnel lockers and lounges; limited food service; housekeeping and maintenance; conference rooms for 15-30 students; and student laboratories for testing certain clinical specimens.

GENERAL PLANNING CONSIDERATIONS

In order to organize the facilities of the University Clinics into an effective whole, the relationships of the total unit to the other units of the Medical Center must first be established. These relationships are shown schematically in Figure 17. Of fundamental importance is the close bond between the hospital and the University Clinics so as to minimize duplication of expensive equipment and staff, and expedite the transfer of patients, records, specimens and supplies between the two units. In many medical centers the in-patient and the out-patient services are combined in a single building. If this is not feasible because of site limitations or other factors, a tunnel or bridge should connect the two buildings, and pneumatic tubes and other communications systems should bind them together.

Within the unit, the location of the different facilities will be determined largely by the plan for access and circulation. Circulation for patients and that for staff and students should be separated as much as possible. Normally all patients should enter the University Clinics in one designated area of the administrative zone where all administrative services based on patient contact are centralized. Patient circulation should be divided as soon as possible after entry so as to permit maximum privacy for the individual patient. Clinical facilities to serve the

obviously deformed and the physically handicapped should be located as near the entrance as possible to lessen the embarrassment of sensitive patients and minimize wheel chair traffic in the corridors and elevators. Waiting areas should be decentralized and none should accommodate more than 10 or at most 16 patients. This means that separate sub-waiting areas should be provided for each basic clinic suite, for each specialized clinical facility, and for each administrative facility in which patients are interviewed. Waiting areas should be provided with natural light and an exterior view whenever possible.

The specialized clinical facilities in the University Clinics should be intimately linked to the Hospital and the Doctors' Office Building, thus enabling patients and doctors in these three units to share these services as necessary. All medical records for the entire Medical Center should be housed in the University Clinics, since the greatest circulation of records is in relation to ambulatory patients. Pneumatic tubes should expedite delivery of records throughout the Center.

THE BASIC CLINIC SUITE

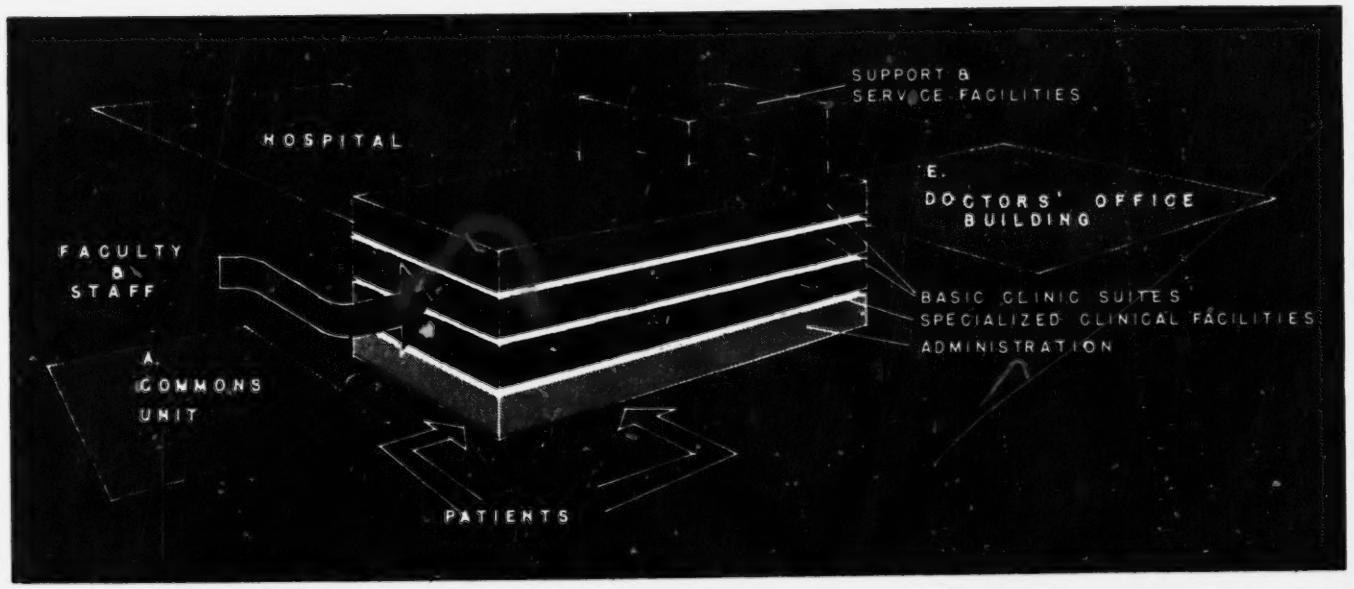
The essential unit of the University Clinics is the basic clinic suite. Each suite is planned to accommodate 4-8 doctors and their patients at one time, and each has a waiting area for 10-16 persons. Movement of patients is controlled from the nursing station, which is also conveniently located for circulation and supply within the suite and from nearby support areas.

The suite is designed and arranged to promote privacy, a feature which is believed essential to good medical care. At the same time, the arrangement is one that will yield optimum benefits in efficiency and flexibility of use. Consultation rooms are separated from examination-treatment rooms. The latter are clustered about the consultation rooms in such a way that, for time-consuming diagnostic studies, a single examining room may be used with a consultation room, while for short return visits, as for prenatal care, three or more examining rooms may be utilized with one consultation room. Examining tables are of all-purpose type. Carts bring from the support zone those supplies and instruments which will convert the suite from one special use to another. All spaces are of adequate size so that there is no sensation of crowding. Each examination room has a curtained area for dressing and undressing.

Each suite has a small conference room where students and preceptors may come together to discuss their cases, plan diagnostic studies and treatments, evaluate results, and share experiences.

Five alternate plans for the basic clinic suites are presented (Figure 18). These plans can be related to each other in a number of ways to give different qualities of circulation, lighting and flexibility. It

FIG. 17. The University Clinics (Unit D). Because of many shared services, and the frequent need to transfer patients, the University Clinics Unit must be intimately bound to the Hospital and the Doctors' Office Building; if the site permits, all three could be combined in a single building. A separation of patients and staff as shown will lessen corridor traffic.



may be advantageous to use suites of different designs on different floors. In each of the plans, the consultation rooms are designated by numbers and the examination rooms by letters.

Scheme A shows a suite that is somewhat less flexible than the others and best suited for care involving short return visits. The plan shows four consultation rooms (1 to 4), each of which has two examining rooms (A to H), and one consultation room (5) which has three examining rooms (I to K). In this plan the assignment of consultation rooms and examination rooms is more or less fixed. Patients enter the suite from one side and staff from another, but within the suite, patients and staff utilize the same secondary corridors.

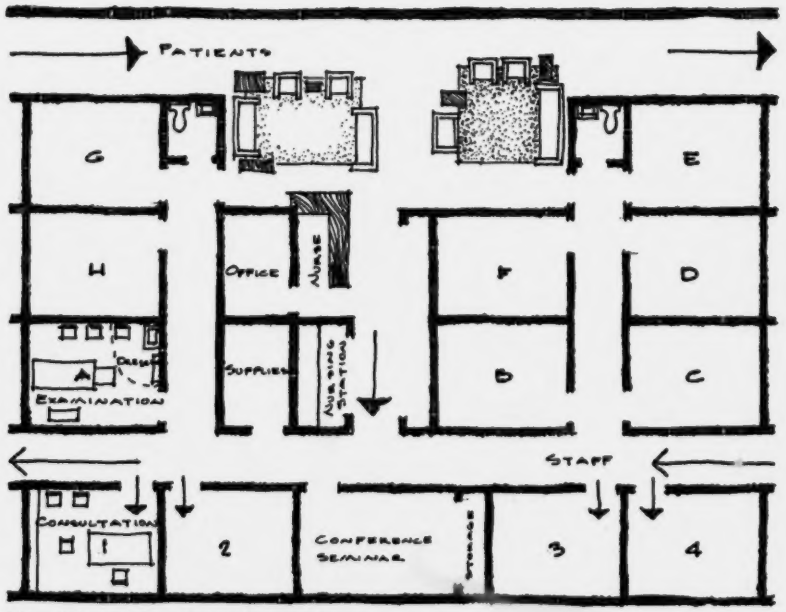


FIG. 18 PLAN OF SCHEME B

FIG. 18. Alternate Plans for the Basic Clinic Suite. In each scheme, the consultation rooms are designated by numbers and the examination rooms by letters. Each suite is more or less self-sufficient and will accommodate 4-8 doctors and their patients at one time. A waiting area, nursing station, supply room, conference room and toilets are shown in each suite. See text for a discussion of the advantages and disadvantages of each scheme.

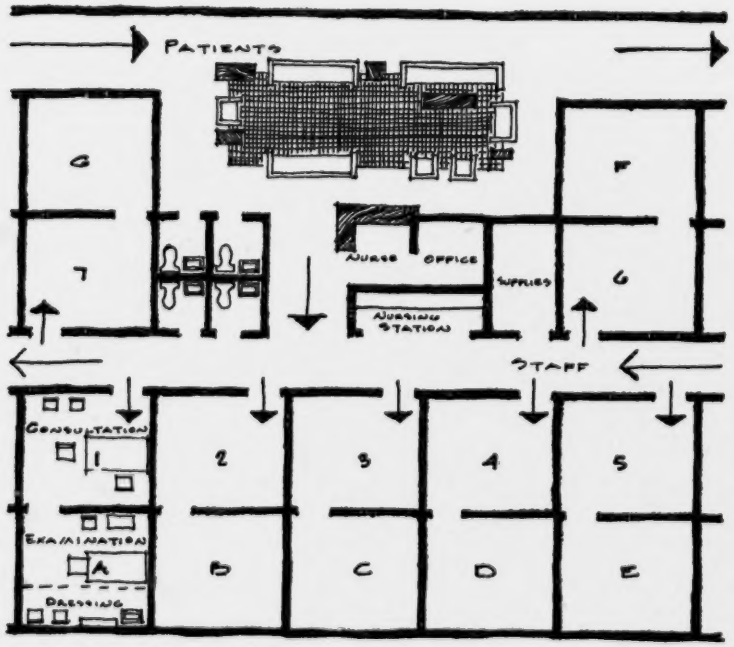


FIG. 18 PLAN OF SCHEME C

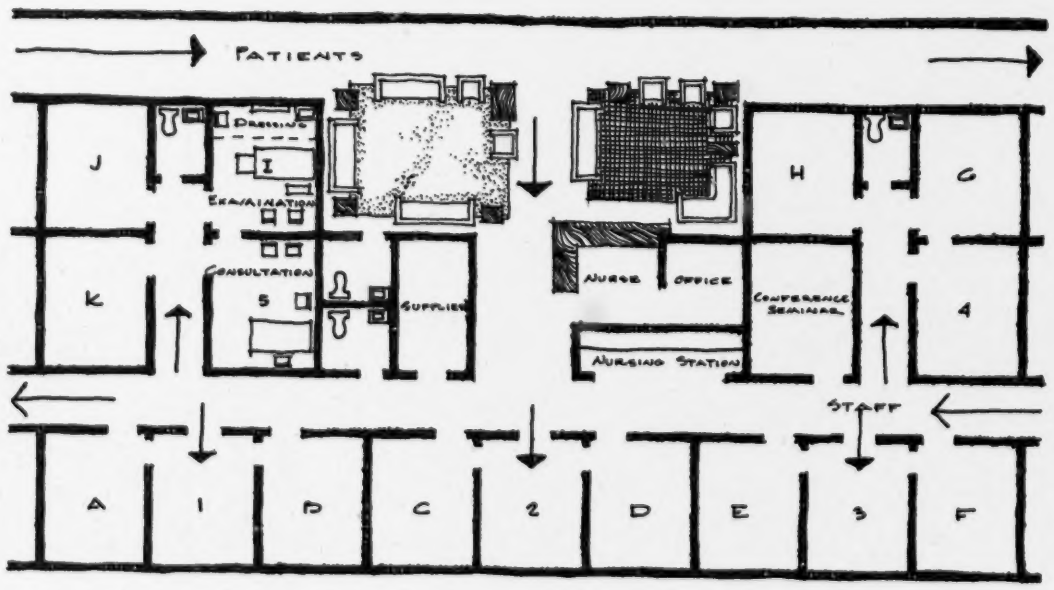
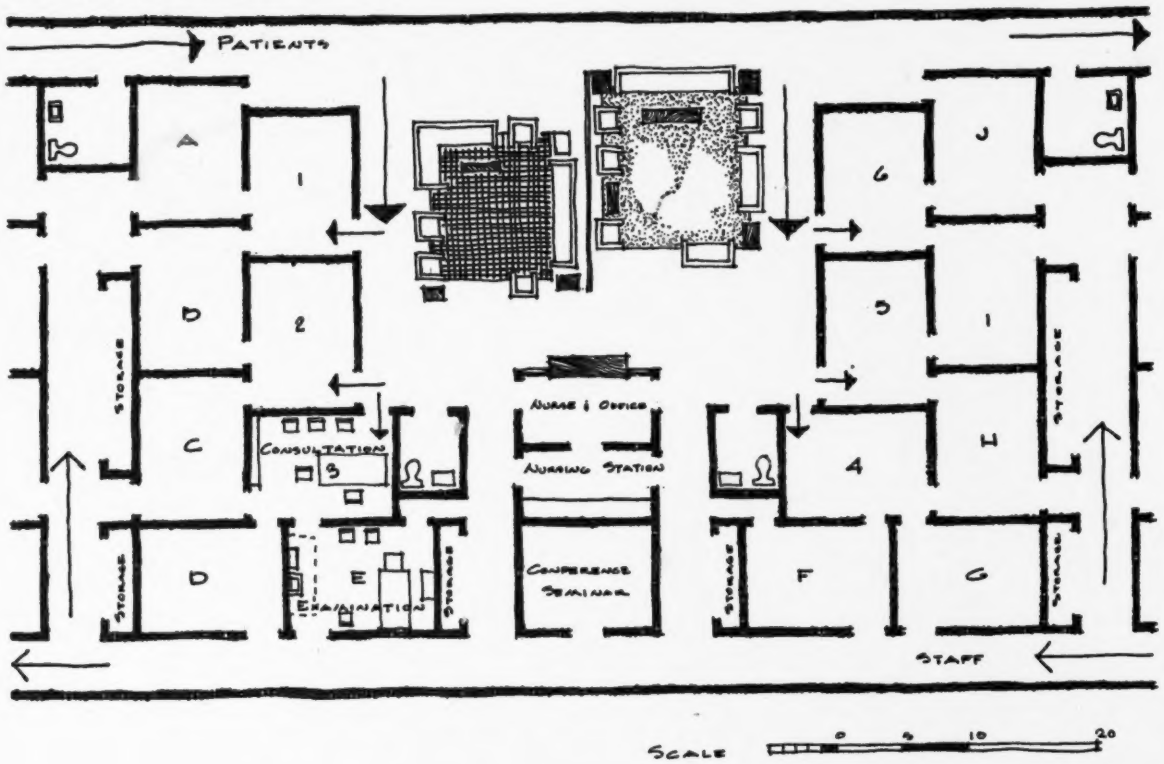


FIG. 18 PLAN OF SCHEME A

FIG. 18 PLAN OF SCHEME D



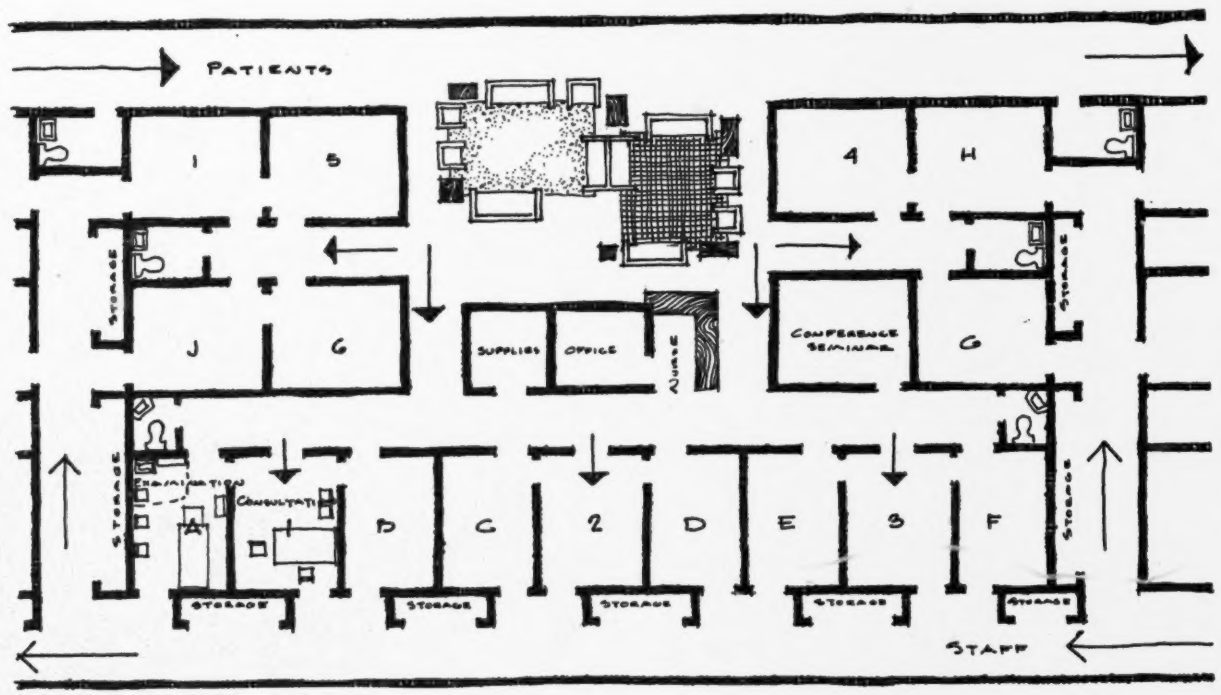


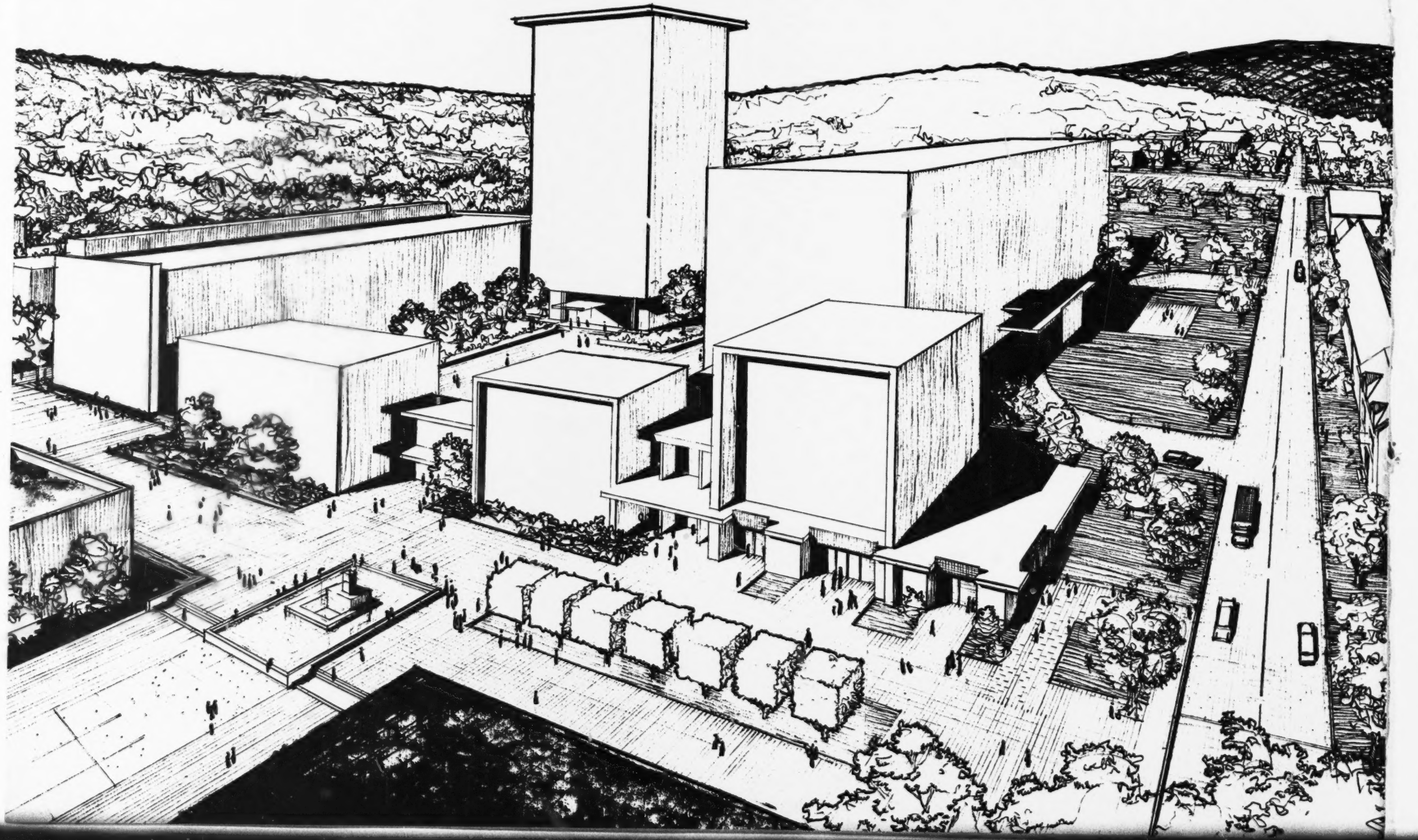
FIG. 18 PLAN OF SCHEME E

Scheme B shows a suite having only four consultation rooms. It achieves greater flexibility than Scheme A, since all examination rooms are located across the corridor from the consultation rooms. With this arrangement, one consultation room can be paired with a single examining room while another is linked to as many as four or five examining rooms. A disadvantage of this plan is that patients may get confused in the more or less public interior corridor.

In Scheme C, all consultation and examination rooms are in a fixed one-to-one ratio, and the examination rooms are accessible only through the consultation rooms. While this plan would not be satisfactory for short return visits to the private physician, as for prenatal care, it would be well suited for student use, since it gives a maximum number of consultation rooms, and a high degree of privacy.

Scheme D offers a large suite in which the waiting area is subdivided; each half of the suite could function separately, if this were desired. The plan has a complicated offset relationship between consultation and examination rooms, resulting in a high degree of flexibility of assignment; for instance, consultation room 1 can use either examination room A or B or both, and consultation room 3 can use any combination of C, D, and E. This plan also provides a complete separation of traffic; patients circulate about the interior, and staff, doctors and equipment carts circulate about the exterior of the suite with access to all examining rooms. With a slight modification of this plan, patients could exit from the examination rooms without going back through the waiting area.

Scheme E is very similar to Scheme A, but has the advantage of separate circulation and extensive storage areas. It is a large suite with six consultation rooms and ten examination rooms.



UNIT RELATIONSHIPS AND SITE PLANNING

GENERAL PLANNING CONSIDERATIONS

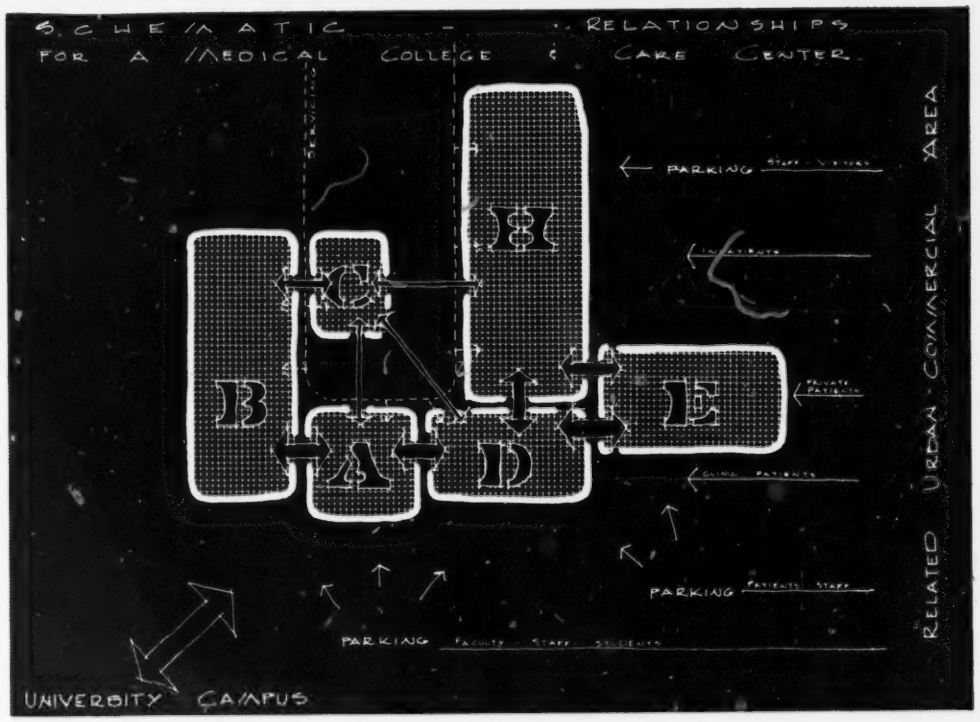
If the functional units A, B, C and D, plus a Doctors' Office Building (E) and the teaching Hospital (H), satisfy the housing needs of the Medical Center, then establishing their optimum interrelationship is the essence of site planning. The following principles are believed to cover the basic points.

In relating the various units of the Center, the most important consideration is the efficient functioning of all the units. Probably the most compelling requirement is that the University Clinics, the University Hospital and the Doctors' Office Building be intimately related to each other so that optimum services are immediately available to all patients at all times. This will mean strong diagnostic and treatment facilities, centrally housed and readily accessible, so that duplication of services is unnecessary. Also of great importance are the linkages that are fundamental to the instructional process and to research, especially the relationship between the Resources Unit and the other units of the Center. The Resources Unit is truly the hub of the entire Medical Center and should be located accordingly. The Medical Sciences Unit and the clinical units of the Center must be near each other so that normal cross-fertilization of ideas can occur. Similarly the whole medical center should adjoin the other units of the University to give and receive intellectual stimulus.

Access and circulation comprise the second most important consideration in site planning. The Hospital, the Doctors' Office Building and the University Clinics Unit especially require direct, easy and safe access to public transportation and to thoroughfares to aid the infirm and the handicapped. Since large numbers of people—patients, visitors, students and staff—will move in and out of the center each day, every effort must be made to reduce traffic in corridors and lobbies. This can be done if separate parking areas are provided for each group, and if circulation is separated by the use of different access routes. Thus patients for the Doctors' Office Building should have a parking area near their destination, and should not mix with patients for the University Clinics, or with members of the Hospital Staff, or with student groups. Zoning of facilities within individual units, as noted in an earlier section, will also help. Trucks and service vehicles should have access to all units below ground level.

Thoughtful attention should be given to those

FIG. 19. Schematic—Relationships of the Units of the Medical Center. Unit D (University Clinics), E (Doctors' Office Building) and H (University Hospital) require the most intimate relationships because they share certain specialized clinical facilities. Unit A (Commons) and Unit B (Medical Sciences) must be closely related to Unit C (Resources), and the latter must also have convenient access to Units D and H.



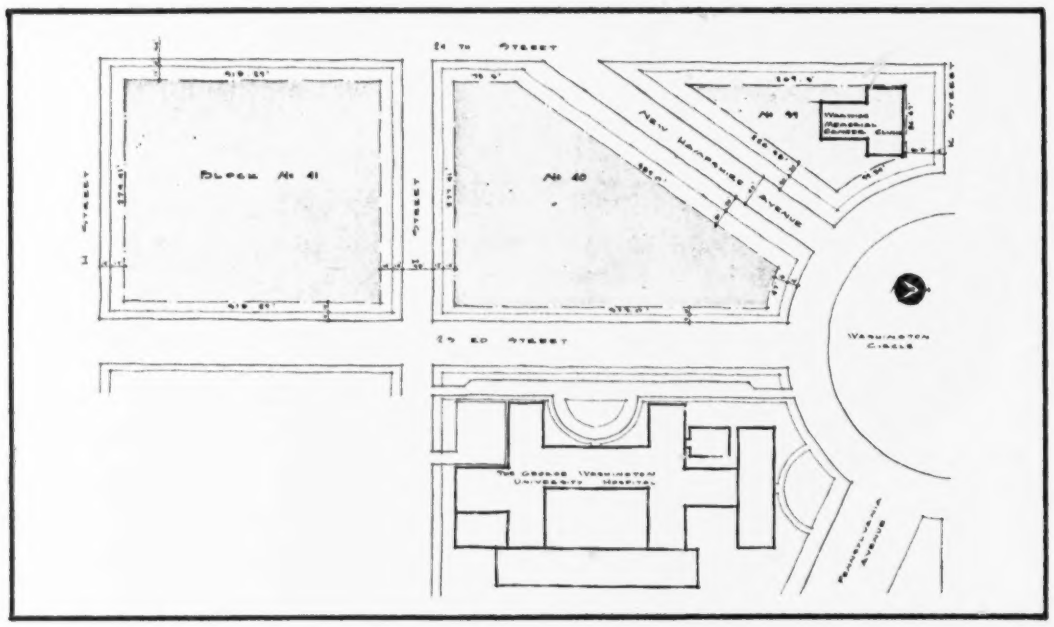
UNIT RELATIONSHIPS AND SITE PLANNING

amenities that will promote the comfort and well-being of everyone using the Medical Center, especially of sick patients. Fresh open vistas should be preserved wherever possible; monotonous building lines should be avoided; noise levels should be kept low by careful attention to circulation; unpleasant odors should be controlled by isolation of their sources and by forced ventilation; traffic hazards should be carefully avoided.

Of practical importance is the location and spacing of units to permit future expansion. This can best be done by leaving a large continuous area of the site undeveloped, perhaps using it in the interim for grade level parking. Consideration should also be given to present and future street and traffic patterns, to proposed plans for public transportation, and to evidence of change in the characteristics of the community and the neighborhood. Thus in one instance, with exceptionally high land values, separation of functional units may be achieved by vertical rather than horizontal zoning, and it may be necessary to erect buildings as high as zoning regulations will permit. In another instance where land values are lower, a larger land area may be used for the medical center, buildings may have low roof lines, and intervening spaces may be planted and landscaped in a more pleasing, less institutional style.

Whether arranged vertically or horizontally, the Hospital, the University Clinics Unit and the Doctors' Office Building must be arranged as a tight cluster of related facilities. The Medical Sciences Unit and the Commons must be closely related to the Resources Unit, which should also be conveniently located to the University Clinics and to the Hospital. Parking facilities should be located at multiple points on the periphery of the Medical Center, and separate entrances to buildings should be designated for particular groups so as to prevent overcrowding in corridors and lobbies. These principles are shown schematically in Figure 19 and more or less in pictorial relationships on page 34.

FIG. 20. The Site for The George Washington University Medical Center. The existing hospital is shown at lower right, across an arterial street (23rd Street) from the site for new buildings in Blocks #40 and #41. I Street, a street with very low traffic density in this block, divides the new area; every effort will be made to effect closure of this section of I Street, since it will otherwise be impossible to develop the site logically. The Warwick Memorial, housing the University's Cancer Clinic and Cancer Research activities is shown in Block #39, at the upper right of the figure, separated from Block #40 by New Hampshire Avenue, a relatively quiet street.



THE EXISTING SITE

The site that has been designated for George Washington University's Medical Center consists of one full block and two other odd-shaped blocks with a total area of somewhat more than three acres (See Figure 20). The site is divided by two streets; in addition, 23rd Street, a major traffic artery, separates the existing hospital from the proposed new units of the Center.

The remainder of the university campus is located east and south of the Medical Center site. To the west are large apartment buildings, and a commer-

cial center is developing in the area surrounding Washington Circle and along Pennsylvania Avenue. An arterial highway will eventually run just west of the site. A rapid transit system has been proposed for the metropolitan area with an extension near the Hospital. These developments may alter the existing traffic patterns in the area.

Most of the site is now zoned for "medium high density—general residence" which dictates a maximum building height of 90 feet, a ratio of total floor area to total site area of 3.5, and a maximum coverage of 75% of the site. Modifications to these zoning restrictions will have to be sought for logical and workable development of the site.

SITE DEVELOPMENT

Two plans for the development of the existing site are presented. Both are based upon the premise that I Street will be closed and that Blocks #40 and #41 can be developed as an uninterrupted whole. Both show the University Clinics Unit and the Doctors' Office Building facing on 23rd Street and connected to the existing hospital by an underground tunnel. Unit E, because of its commercial aspects, is thrust into the commercial area developing on Washington Circle.

Alternate A (Figure 21) provides open interior courts in an attempt to develop a campus-like setting. If necessary, some of the unoccupied space could be used for future expansion of Units A, B, C and D, without disturbing the integrity of the initial relationships between the units.

Alternate B (Figure 22) locates the Resources Unit as the focal point of the Medical Center. This arrangement has obvious advantages but does limit the possibility of future expansion of each individual unit.

If zoning restrictions can be changed to permit higher buildings it is likely that other plans will be considered for the development of the site.

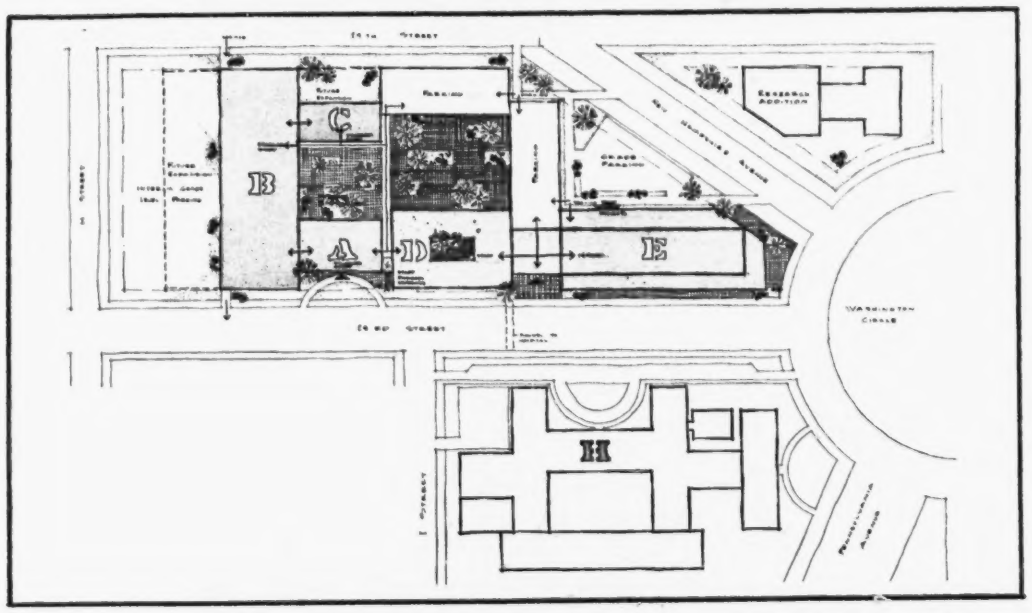
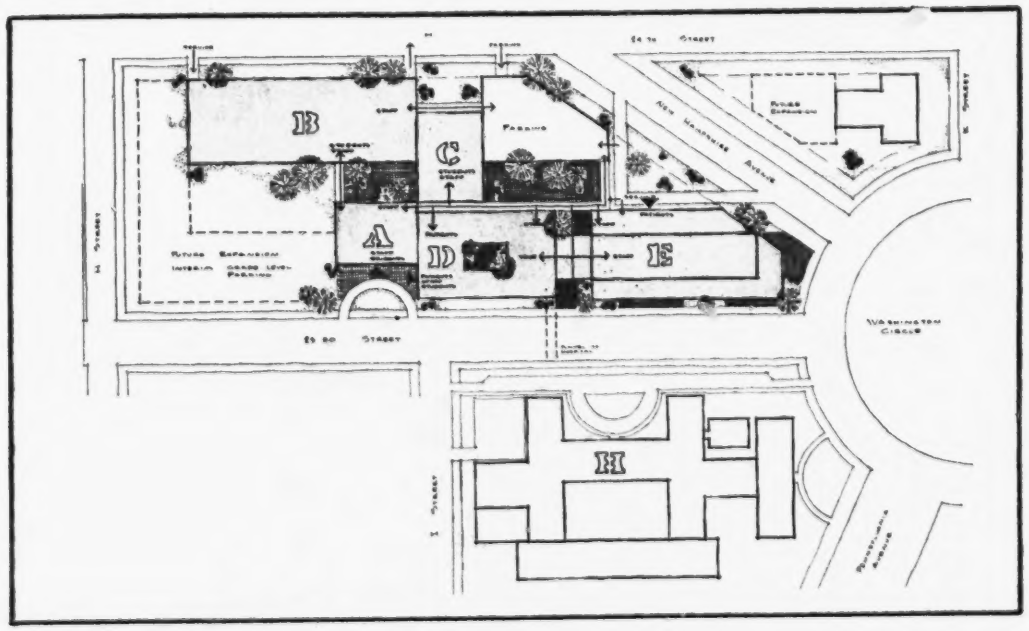


FIG. 21. Site Development—Alternate Plan A. The University Clinics (Unit D) and Doctors' Office Building (Unit E) face 23rd Street and are connected to the existing hospital by a tunnel. The placement of the units is such as to allow for future expansion of each unit without disturbing their interrelationships.

FIG. 22. Site Development—Alternate Plan B. While quite similar to Alternate Plan A, Plan B locates the Resources (Unit C) as the hub of the new area. With this plan it will be easy to expand the Medical Sciences (Unit B) but expansion of other units will be difficult to achieve.



APPENDIX

The Definition of Instructional Needs

The foregoing study was undertaken to meet the specific needs of the educational program of The George Washington University School of Medicine. This educational program is presented briefly in the following sections, as background material for the architectural plans.

TABLE E. Term I of the New Curriculum, The George Washington University School of Medicine

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8-9	Anatomy	Anatomy	Anatomy	Anatomy	Anatomy	Anatomy
9-10	"	"	"	"	"	"
10-11	"	"	"	"	"	"
11-12	"	"	"	"	"	"
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-2	Biochemistry	Biochemistry		Biochemistry	Biochemistry	
2-3	"	"		"	"	
3-4	"	"		"	"	
4-5	"	"		"	"	

	Semester Hours
ANATOMY	
6 lecture periods (50 minutes each) per week x 16 weeks	6
6 laboratory periods (3 hours each) per week x 16 weeks	6
BIOCHEMISTRY	
4 lecture periods (50 minutes each) per week x 16 weeks	4
4 laboratory periods (3 hours each) per week x 16 weeks	4
ELECTIVES	
none	0
TOTAL SEMESTER HOURS REQUIRED, SEMESTER I	20

TERM I OF THE NEW CURRICULUM (see Table E)

When the new program is in full operation, two new classes will be admitted each year, and the courses of Term I will be presented in the Summer and again in the Fall Semester.

1. ANATOMY: The block of time designated as Anatomy in Term I covers five interlocking disciplines:

- Gross Anatomy accounts for about three-fifths of Anatomy's total time. This course includes lectures for the whole class supported by all forms of audiovisual aids, followed by laboratory periods for dissection. In some schools, two students work at each dissecting table but at G. W., the usual team consists of four students. A study desk or reading stand is provided for each student, near his team's dissecting table. The number of dissecting tables is the basic factor in determining the size of this laboratory. The tables may be arranged either in a single large open space or in a series of smaller rooms. Demonstration areas should be provided for exhibit dissections, specimen displays, anatomical models and x-ray viewing. Special consideration should be given to lighting and ventilation of the dissecting laboratory, and to the space requirements for receiving, preparing, storing and moving of cadavers. Facilities for cremation should also be provided.
- Microscopic Anatomy (Histology) is a microscope-oriented course taught by lectures and laboratory studies. Lectures for the whole class should be supported by all types of audiovisual aids. In laboratory, the student sits at an assigned bench or table to use his microscope. Minimal storage space is required for each student. Electric outlets must be provided, but gas, water and other utilities are normally not required.
- Embryology is also oriented towards the microscope and the course is ordinarily taught in parallel with Histology, using similar methods and facilities.
- Neuroanatomy is sometimes merged with Gross and Microscopic Anatomy, but more often is taught as a separate course; ordinarily it shares lecture and laboratory space with these two courses.
- Genetics is a subject taught by several departments at The George Washington University; the basic course shares space and time with Anatomy.

2. BIOCHEMISTRY: This course is normally taught as a combination of lectures and laboratory experiments involving the whole class simultaneously. Lectures require the usual instructional facilities, but closed circuit television is rarely needed. During the laboratory period the students usually stand at their benches to conduct their analyses. Gas, electricity, water, compressed air and vacuum are normally required at each bench. Each student has a locked cabinet in which he keeps certain basic equipment and supplies issued at the beginning of the term. Reagents are ordinarily prepared by technical assistants and put out each day. Certain large pieces of equipment such as fume hoods, balances, centrifuges, photometers and isotope counters are shared by the students in small groups.

TABLE F. Term II of the New Curriculum, The George Washington University School of Medicine

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8-9						
9-10	Microbiology	Microbiology	Microbiology		Microbiology	
10-11	"	"	"	•	"	•
11-12	"	"	"		"	
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-2	Physiology	Physiology	Physiology		Physiology	
2-3	"	"	"		"	
3-4	"	"	"	•	"	
4-5	"	"	"		"	

	Semester Hours
MICROBIOLOGY	
4 lecture periods (50 minutes each) per week x 16 weeks	4
4 laboratory periods (2 hours each) per week x 16 weeks	4
PHYSIOLOGY	
4 lecture periods (50 minutes each) per week x 16 weeks	4
4 laboratory periods (3 hours each) per week x 16 weeks	4
*ELECTIVES (basic science, approved University courses or student research projects)	4
TOTAL SEMESTER HOURS REQUIRED, SEMESTER II	20

TERM II (See Table F)

The following courses will be offered in Fall and Spring Semesters.

1. MICROBIOLOGY: The block of time designated as Microbiology is divided between five closely related subjects:

- Bacteriology accounts for perhaps four-fifths of the total time. The lecture phase of this course requires strong support from audiovisual aids including television. Some laboratory studies are carried out while the students are seated and others while they are standing. There is a considerable issue of small items which must be stored at each student's bench. Microscopes are used extensively to study stained smears prepared from bacterial cultures. Refrigerators, incubators, autoclaves, centrifuges and sterilizers are used by the students in groups. Each student must have ready access to a small sink for staining slides. Gas and electricity must be provided at each bench. In some instances small animals may be used for special studies.
- Parasitology is largely a microscope-oriented course using prepared materials. Its requirements are like those of Bacteriology.
- Mycology involves both cultural and microscopic studies identical to those for Bacteriology.
- Virology is largely a lecture-demonstration course using cell cultures, eggs and small animals.
- Immunology is a lecture-laboratory course dealing with blood serum, cultures, reagents and test tubes.

2. PHYSIOLOGY: Lectures in this course are frequently combined with demonstrations of mammalian experiments and require closed circuit television for adequate class viewing. Many other types of audiovisual aids are also used.

Laboratory studies in Physiology cover a wide range of experiments and require many different large items of equipment. Some experiments call for monitoring and recording of vital observations on anesthetized animals, others consist of measurements on the students themselves, and still others involve observations on biological materials in test tubes. Rather than provide facilities for all of these experiments at each work bench, moving equipment in and out as required, it is common practice to set up a series of "stations" and to rotate the students through these stations on a time schedule. These stations are usually small individual laboratories, each designed for a specific type of experiment; heavy equipment is installed more or less permanently where it will be used. Thus it is possible to save set-up time

and reduce costs materially, although with some loss of flexibility. Gas, water, compressed air and vacuum should be available at each bench, and each bench should accommodate four students.

3. ELECTIVES: Most of the electives in Term II are of conference and seminar type, and are offered by those departments having their required course-work in Term I, i.e., Anatomy and Biochemistry. These courses require several rooms, each suitable for 10-50 students, and equipped for the use of audiovisual aids. Note that these rooms are utilized for Term II electives only on Thursdays and on Saturday mornings.

Certain students are encouraged to undertake research projects beginning in this term, and completing them during their full time elective period three years later. At this early phase these projects may involve library work only and hence have no space requirements, but later they may require laboratory space.

Other electives may call for classroom or laboratory space in other divisions of the University.

TERM III (see Table G)

These courses will be offered in Fall and Spring Semesters.

1. PHARMACOLOGY: This course resembles Physiology in its spatial requirements. Lectures are frequently supplemented by animal experiments which can best be demonstrated to the whole class by closed circuit television. The laboratory instruction is varied and includes most of the techniques already noted for Physiology. GW's solution to Pharmacology's needs will probably be to provide small laboratories, each equipped for a special purpose, with students rotating through these "stations" on a schedule.

2. PATHOLOGY: This course, as presently taught at GWU, consists of lectures, laboratory exercises and special demonstrations. Lectures are illustrated with 35 mm. color slides showing the gross and microscopic changes in diseased organs. The laboratory period is used for the individual study of prepared specimens, gross and microscopic, and for case reviews.

In the laboratory the student works seated at a bench much like that required for Microbiology. Space must be available in or adjacent to the laboratory for the student to examine selected gross specimens from the pathology museum. These specimens are changed each day to correspond with the lecture course.

TABLE G. Term III of the New Curriculum, The George Washington University School of Medicine

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8-9		•	Pharmacol.	•		•
9-10	Pharmacol.		"		Pharmacol.	
10-11	"		"		"	
11-12	"		"		"	
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-2	Pathology		Pathology		Pathology	
2-3	"	•	"	•	"	
3-4	"		"		"	
4-5	"		"		"	

	Semester Hours
PHARMACOLOGY	
4 lecture periods (50 minutes each) per week x 16 weeks	4
3 laboratory periods (2 hours each) per week x 16 weeks	3
PATHOLOGY	
4 lecture-conference periods (50 minutes each) per week	4
3 laboratory periods (2-3 hours each) per week	3
*ELECTIVES (basic science, approved University courses, or student research projects)	6
TOTAL SEMESTER HOURS REQUIRED, SEMESTER III	20

The special demonstrations are phased somewhat for the different portions of the course. During the first portion emphasis is on microscopic studies, and the demonstrations consist of projection sessions with groups of 25-35 students. During the second portion of the course, emphasis is on the gross changes in organs, and the demonstrations consist of autopsies and conferences based on fresh gross specimens. Autopsy facilities are provided in the University Hospital. Small amphitheatre-type rooms, in which the students can sit in tiers all around the instructor, are ideal for the conferences on gross specimens. Special wash-up facilities are required. During the final portion of the course demonstration time is used to present clinicopathologic correlation conferences.

The pathology museum is an important adjunct instructional space. In addition to display areas, preparation rooms are required.

3. ELECTIVES: The Departments of Anatomy, Biochemistry, Physiology and Microbiology will offer electives on Tuesdays, Thursdays and Saturdays during this term. Most of these courses will be of conference-seminar type, but some may include laboratory experiments. Rooms suitable for 10-50 students will be required.

TERM IV (see Table H)

These courses will be offered in Spring and Summer Semesters.

1. CLINICAL LECTURES: The courses scheduled for Monday and Friday mornings are lecture courses and require one whole-class lecture hall equipped for all types of audiovisual aids including closed circuit television. The Wednesday morning period in Psychiatry is held in a psychiatric hospital and consists of work with patients in small groups.

2. PHYSICAL DIAGNOSIS. This course is a series of lectures illustrated by audiovisual aids, including closed circuit television, followed by the examination of selected patients in the hospital. Plans are under way to develop life-size manikins for use in the first part of this course.

3. CLINICAL LABORATORY: This course consists largely of lecture and laboratory studies in hematology, urinalysis and clinical microscopy. Audiovisual aids, including closed circuit television, are used to reinforce the lectures. The laboratory studies require water, electricity, gas and vacuum. The student laboratory designed for Microbiology or for Biochemistry serves equally well for this course.

4. ELECTIVES: The elective subjects of Term IV come largely from the six basic sciences and consist of conferences, seminars and laboratory courses. Some of the pathology electives are housed in the University Hospital and related to departmental activities there.

TABLE H. Term IV of the New Curriculum, The George Washington University School of Medicine

(a) First 8 weeks

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8-9	Psychiatry		Psychiatry		Psychiatry	
9-10	Contin. Med.	•	"		Contin. Med.	•
10-11	Ophthalmol.		"		Ophthalmol.	
11-12	Radiology		"		Radiology	
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-2	Physical		CPC		Physical	
2-5	Diagnosis	•	Clinical Laboratory		Diagnosis	•

(b) Second 8 weeks

8-9	Psychiatry		Psychiatry		Psychiatry	
9-10	Physical Med.		"		Physical Med.	
10-11	Dermatology		"		Dermatology	
11-12	Otolaryngol.		"		Otolaryngol.	

(afternoon schedule same as for the first 8 weeks)

	Semester Hours
PSYCHIATRY: 3 lectures, one 3-hour "laboratory" per week x 16 weeks	4
PHYSICAL DIAGNOSIS: 2 lectures, two 3-hour "laboratories" per week x 16 weeks	4
CLINICO-PATHOLOGIC CONFERENCE: 1 hour per week x 16 weeks	1
CLINICAL LABORATORY: 1 lecture, one 2-hour "laboratory" per week x 16 weeks	2
MEDICAL AND SURGICAL SPECIALTIES: Continuity Medicine, Ophthalmology, Radiology, Physical Medicine, Dermatology, Otolaryngology (16 lectures each)	6
*ELECTIVES (basic science, approved University courses, or student research projects)	3
TOTAL SEMESTER HOURS REQUIRED, TERM IV	20

TERM V (see Table I)

These courses will be offered in the Fall Semester and again from about April 9 to July 27 of each year.

This term is the final phase of preparation for the responsibilities of the clinical clerkship. Term V incorporates certain ideas that

APPENDIX

are new to medical education and will require special consideration for housing.

1. MAJOR CLINICAL SITUATIONS: This course, occupying the morning hours of the first half of the term, is a sort of dress rehearsal for the clinical experiences which will follow. The course is based upon the reasonable premise that the student should know something about diagnostic and therapeutic procedures before he is called upon to use them. The class is divided into three sections which rotate through three stations each week. Each of the three classrooms for this course will be in the Commons Unit and will be specially designed to simulate a hospital room (see Figure 2). A hospital bed with a life-size manikin in it, and the usual hospital furniture, will normally be included. Other equipment, such as oxygen tent, surgical dressing cart, and monitoring devices will be

TABLE I. Term V (tentative) of the New Curriculum, The George Washington University School of Medicine

(a) (First 8 weeks)

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8-12	Major Clinical Situations	•	Major Clinical Situations	•	Major Clinical Situations	First 4 wks. Forensic Medicine Second 4 wks. Electives
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-3	Medicine	•	Pediatrics	•	Medicine	
3-5	Surgery		Ob-Gyn		Surgery	

(b) (Second 8 weeks)

8-12	Continuing Care	•	Continuing Care	•	Continuing Care	•
12-1	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1-3	Neurology & Neurosurgery	•	Anesthes.	•	Neurology & Neurosurgery	
3-4	Urology		Orthopedics		Urology	
4-5	Comm. Health				Comm. Health	

	Semester Hours
MAJOR CLINICAL SITUATIONS (3 lectures, three 3-hour "laboratory" periods per week for 8 weeks)	3
CONTINUING CARE PROGRAM (3 conferences, three 3-hour "laboratory" periods per week for 8 weeks)	3
MEDICINE (two 2-hour conferences per week for 8 weeks)	2
SURGERY (two 2-hour conferences per week for 8 weeks)	2
PEDIATRICS (one 2-hour conference per week for 8 weeks)	1
OBSTETRICS AND GYNECOLOGY (one 2-hour conference per week for 8 weeks)	1
NEUROLOGY AND NEUROSURGERY (two 2-hour conferences per week for 8 weeks)	2
UROLOGY (two lectures per week, 8 weeks)	1
COMMUNITY HEALTH (two lectures per week, 8 weeks)	1
ANESTHESIOLOGY (one 2-hour conference per week, 8 weeks)	1
ORTHOPEDICS (one 2-hour conference per week, 8 weeks)	1
*ELECTIVES (basic science or clinical courses, or student research projects)	2
TOTAL SEMESTER HOURS REQUIRED, TERM V	20

brought in as needed. Various techniques will be demonstrated by the instructor and then practiced by the students on the specially designed manikins. The classrooms should be so intimately arranged that thirty-five students in their seats can see clearly each detail demonstrated by the instructor. Three tiny amphitheatres seem to answer this need best.

2. CONTINUING CARE: This is the featured program of the second half of this term. Students will be divided between several hospitals in the City. For about one-third of the class the instruction will be housed in the University Clinics Unit of the medical center; for the remainder of the class, similar facilities will be provided elsewhere. During this eight-week period, each student becomes thoroughly familiar with his own small group of patients, under the close personal supervision of his preceptors. The patients in this program are ambulatory, and the student sees them under circumstances which simulate private office practice as closely as possible. During the hours assigned, each student requires the exclusive use of a consultation room and an examination room.

3. CLINICAL LECTURES AND DEMONSTRATIONS: These periods are scheduled in most instances as two-hour blocks of time so that the lecture can be followed by a case presentation if the instructor wishes. The series requires a room large enough for the whole class, generously equipped with audiovisual aids including closed circuit television. The classroom should be convenient to both the University Clinics Unit and to the Hospital, so that patients can be brought in as required.

4. FORENSIC MEDICINE: For this instruction the class is divided into three groups and each group meets with a section of the senior class of the Law School of The George Washington University. These are moot court sessions and the cases selected for trial are examples of alleged medical malpractice. The medical students participate actively, some as defendants, others as witnesses for the defense or the plaintiff, still others as members of the jury. The program is conducted in the regular practice court rooms of the Law School.

5. ELECTIVES: The elective courses of Term V, like those of Term IV, may be derived from any of the six basic sciences. Clinical courses of seminar or conference type may also be presented during this term, and student projects in clinical research may be begun at this time.

TERMS VI-IX (see Table J)

All of the units of the clerkships will operate continuously.

The final 16 months of the new curriculum will consist of 11 months of Progressive Clerkship providing graduated increase in responsibility, 3 months of Electives, and a two-months' vacation period. The students will move through this sequence in sections, according to schedule. Special guest lectures are scheduled every few weeks, but there are no regular lectures or other whole-class activities during this 16 month period.

Table J. The Final Sixteen Months of the New Curriculum (Terms VI-IX), The George Washington University School of Medicine

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Section A	Progressive Clerkship											Vacation		Electives		
Section B	Elec-tive	Progressive Clerkship										Vacation		Electives		
Section C	Electives	Progressive Clerkship										Vacation		Elec-tive		
Section D	Electives	Progressive Clerkship										Vacation				
Section E	Vaca-tion	Electives	Progressive Clerkship												Vaca-tion	
Section F	Vacation	Electives	Progressive Clerkship													

	Semester Hours
THE PROGRESSIVE CLERKSHIP (11 months) (all students will follow the same sequence, beginning with Psychiatry)	
PSYCHIATRY (1 month)	5
IN-PATIENT MEDICINE (2 months)	10
IN-PATIENT SURGERY (2 months)	10
OBSTETRICS AND GYNECOLOGY (1½ months)	8
PEDIATRICS (1½ months)	8
EMERGENCY ROOM (1 month)	5
UNIVERSITY CLINICS (2 months)	10
CONTINUING CARE (8 months, average 2 hours per week)	4
ELECTIVES (3 months)	15
TOTAL SEMESTER HOURS REQUIRED, FINAL 16 MONTHS	75

1. IN-HOSPITAL CARE: The first 9 months of the Progressive Clerkship will consist of closely supervised student participation in the care of hospitalized patients, in sequence according to the following schedule: Psychiatry 1 month, In-patient Medicine 2 months, In-patient Surgery 2 months, Obstetrics and Gynecology 1½ months, Pediatrics 1½ months, and Emergency Room 1 month. The University Hospital and the several affiliated teaching hospitals will provide the facilities necessary for this important period of the student's development.

2. UNIVERSITY CLINICS: The last 2 months of the Progressive Clerkship will be spent in the University Clinics, where the student will be working with ambulatory patients. Here the student will learn health maintenance and health counseling, and will have an opportunity to improve his skill in the art of medicine. Here the student's day-to-day experiences will most closely approximate the normal activities of the physician's office.

To accomplish these goals, a new and appropriate setting must be devised in which to nurture the concept of the personal nature of good medical care. The facilities for ambulatory care must be substantially upgraded from those which usually prevail in the "teaching clinic." The large waiting room must be replaced by smaller waiting areas in which patients have a degree of privacy. The long lines and the interminable delays at the registration desk and the pharmacy window must give way to prompt, efficient service. The consultation room must be quiet, and furnished and lighted in such a way as to make the patient feel at ease with his student doctor. The examination room must have, in addition to the usual facilities for

the examination, a private area for the patient to undress and to dress, and for the woman patient to tidy up her disarray after the examination.

3. ELECTIVES: The last elective period is of three months' duration, and full-time. The period may be spent either as a unit on a single assignment or it may be split among two or three different assignments. Most of the facility needs for this instructional period are already available, either in affiliated hospitals or in research institutes. There will be a need for additional laboratory space in the basic sciences, to house students working on approved research projects, but this is the only new space that will be required.

DEFINITION OF INSTRUCTIONAL NEEDS FOR NON-MEDICAL STUDENTS

As with most university medical schools, the faculty of The George Washington University School of Medicine has a large and growing responsibility for the instruction of undergraduate and graduate students seeking degrees in chemistry, zoology, nursing, hospital administration, medical technology and other health sciences. Fifteen to 60 students are enrolled in non-medical courses in Biochemistry, Physiology and Microbiology. Such students normally require their own group laboratories but may in some instances share laboratories with medical students on an alternate half-day basis. In some instances, as in medical technology, the courses are presented in the University Hospital rather than in the School of Medicine.

A somewhat different problem is presented by those students seeking advanced degrees in the medical sciences. They require small seminar or conference rooms for most of their formal course work. In GWU's curriculum such rooms can be shared with the elective courses in the basic sciences for medical students. In addition, graduate students in the medical sciences require laboratory space to carry out their individual research projects. Normally this space is in that area of the medical sciences building devoted to faculty research, since graduate students often participate in faculty research programs.

DEFINITION OF INSTRUCTIONAL NEEDS FOR CONTINUING MEDICAL EDUCATION AND OTHER SPECIAL PURPOSES

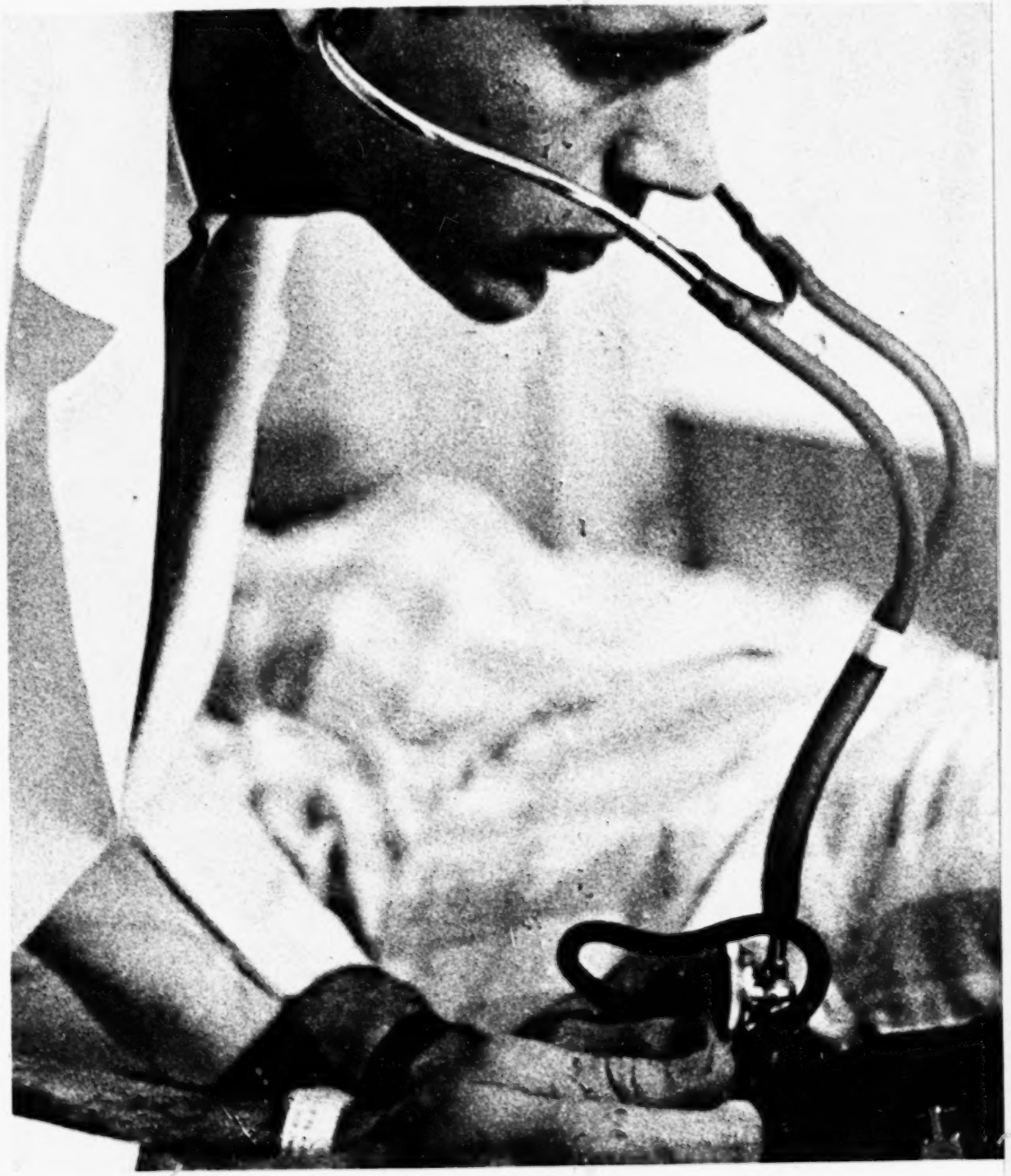
Facilities for the education of hospital interns and residents are normally provided in the teaching hospitals, and this is the case at George Washington. A large conference room and several smaller rooms are presently available for this purpose in the University Hospital, and additional rooms will be provided when the new hospital wing is completed in 1965. A branch of the medical school library is housed in the University Hospital.

Most medical schools accept the responsibility to provide continuing education for practicing physicians in their own communities, states or regions. In normal times this consists of a few weeks each year of full-time intensive courses, and a few evening courses. In abnormal times, as following a war, the demand is greatly increased and the number of physicians registered in post-graduate courses may exceed the number of medical students. Such courses require one or more lecture halls or auditoria adequate to house up to 100 students, equipped for all types of audiovisual support, with special emphasis on closed circuit television. These halls should be located near the Hospital, the University Clinics and the library so that physician-students can make maximum use of these facilities.

The Medical Center should also provide meeting places for regional and national groups in which members of the faculty take an active part. Such meetings may require an auditorium for several days, preferably with adjacent space for scientific exhibits.

Finally, there is the need for facilities in which to conduct occasional examinations for outside groups, such as the National Board of Medical Examiners or the American Board of Surgery. Requests of this type are frequently received by local faculty members, and it adds to the stature of the medical school if these needs can be met.

In most instances the needs for continuing medical education and other special purposes, as discussed under this heading, can be accommodated in classrooms normally assigned to the basic science departments. Under GWU's new curriculum, there will always be at least one classroom available for such special purposes. Allowing time for normal maintenance and occasional remodeling, it should be possible to schedule these extracurricular activities in any term of the year.



The George Washington University

A Private, Nonsectarian University in the Nation's Capital

Founded in 1821